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Trade Prospects

An earlier generation, when dealing with trade prospects, averred that if agriculture and the building trades were busy, then the rest of industry could take care of itself. To-day, there is a plethora of statistics designed to assist prognostication, yet because of international complications and the chaotic state in which the world finds itself, no clear picture is apparent. There is much good logic in support of the view that ironfoundry statistics provide excellent data for appraising the state of the industrial barometer. Because of its basic character, an analysis of its output gives an insight as to what the various branches of industry are buying related to their previous purchases. Obviously, the global figures reflect the business of the whole country.

The statistics for the first quarter of this year, just published by the Council of Ironfoundry Associations, show that this section of the industry is still achieving a record output. At 880,875 tons for the quarter, the industry is running at the rate of over 3½ million tons a year. From time to time the headings vary and, unlike the earlier tables, the Service requirements find no place, whilst others, such as food processing and sewing machines, are now listed. The best improvement recorded was that of agricultural implement castings (23.2 per cent.), followed by rainwater goods (9.5), motor car castings (7.3), textile machinery castings (5.5), cast-iron pipes (4.5) and machine-tool castings (3.8 per cent.). Headings under which decreases were registered were railway carriage and wagon castings (10.6 per cent.), domestic appliance castings (5.1), iron and steel works plant (5.0), and locomotive castings (4.3).

In the above figures the tenets of our forefathers are clearly shown—that is, the outlook for agriculture and building is promising. Thus, on a home-market basis, the course is set " fair." However, there are the international conditions to consider, and an examination of the Board of Trade Returns, the coming to an end of " Marshall " aid, the recession in American business, plus current unrest in the home labour situation makes the picture appear extremely gloomy, and prophesy difficult. Yet there is much of satisfactory character about these ironfounding statistics, as there is probably a higher percentage of home-produced raw materials than most industries. Certainly there is in the background the importation of iron-ore and scrap, but the percentage value as related to the total production costs is not in the same category as, say, textiles or chemicals. What percentage of the iron castings made is eventually exported is difficult to state. It is probably not high, but the part they play in producing goods for export is of cardinal importance. The motor cars exported carry but a modicum of castings, but the machine tools and equipment used in their production and transport are outstanding factors in British industry. If a person is of good repute and is businesslike, he can usually get credit. So, too, if the world is convinced that this country is efficient and stable, credits will be forthcoming. It is just this confidence which matters. Statistics, such as those the ironfoundry and the iron and steel industry have published, will favourably influence world opinion and investment. Is the future bright?

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Correspondence

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

THE PROPERTIES OF HIGH-DUTY CAST IRON

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—We have noted with no little pleasure the letter from Dr. A. B. Everest in your issue of May 26, in which he comments upon the lecture delivered recently, for the purpose, as stated in the text, "to outline the extent of the progress made in regard to the characteristic properties of high-duty material, with special reference of its consistent dependability as an engineering material."

The objective of the "Meehanite Process" is the production of castings in high-duty iron, which have consistent strength and other properties necessary to meet specific service requirements. It is, therefore, most gratifying to us to read his statement that "Meehanite is justifiably recognised as a class of high-duty iron outstanding for quality, regularity and reliability," and we are obliged to Dr. Everest for this confirmatory evidence that the objective has been achieved.

In reference to the omissions he mentions, it must be remembered that the lecture, the full title of which was "Meeting High-performance Demands in Engineering Construction with 'Meehanite' Metal," was delivered before an audience of engineers, with the object of bringing to their notice the properties of this metal and that they can use it with complete confidence where severe duty is imposed on parts of machines and structures. It was, therefore, considered undesirable to obscure the issue by including the metallurgical principles involved.

In so far as the relation between the various engineering processes of "Meehanite" and the British Standard Specifications is concerned, it is agreed that such information might well have been included. As a matter of fact, the relationship was mentioned during the lecture, and it is given in the company's Specification Book, a copy of which may be obtained on application to the address shown below.

In conclusion, we desire to thank Dr. Everest for his generous appreciation of our material.—Yours, etc.,

A. CAMPION,
International Meehanite Metal Company, Limited.

66, Victoria Street, London, S.W.1.

House Organ

Foundry Practice, No. 95. Issued by Foundry Services, Limited, Long Acre, Nechells, Birmingham, 7.

This issue opens with a short article of particular interest. It shows how a nickel-silver casting was defective due to the use of quite unsuitable moulding sand. The balance of the contents follows the normal pattern and includes a further instalment of an article on iron-founding, an article on gravity die-casting, and more foundry definitions and formulæ.

Forthcoming Events

(Secretaries are invited to send in notices of meetings, etc., for inclusion in this column.)

JUNE 11.
Institution of Production Engineers.
Leicester Section:—Second conducted tour of the Municipal Waterworks at Cropston, Leicester.

JUNE 14.
Wolverhampton Graduate Section:—"Aluminium Alloys and their Fabrication," illustrated by a film, presented by the Aluminium Development Association at the Wolverhampton and Staffordshire Technical College, Wolverhampton, at 7.15 p.m.

Institute of Welding.
North London Branch:—Visit to the Brighton Locomotive Works, leaving Victoria Station, London, at 1.28 p.m.

JUNE 14 to 17.
Institute of British Foundrymen.
Annual Conference at Leamington Spa. Detailed programme published in the JOURNAL, March 24, p. 263.

JUNE 15.
Women's Advisory Council on Solid Fuel.
Annual Conference: "New Hearths for Old," at the Henry Jarvis Memorial Hall, Royal Institute of British Architects, Portland Place, London, W.1, commencing at 11 a.m.

Institute of Metals

The Council of the Institute of Metals (London) has appointed the following members to be Honorary Corresponding Members to the Council for their respective countries:—

Spain.—Prof. J. Orland, M.Sc., M.A., PhD., D.D, Professor and Chief of the Department of Metallography and Strength of Materials, *Instituto Católico de Artes e Industrias*, Madrid.

Sweden.—Prof. A. G E. Hultgren, Professor of Metallography, *Tekniska Högskolan*, Stockholm (Additional).

United States.—Prof. R. F. Mehl, B.S., Ph.D., Hon.Eng.D., Hon.Sc.D, Director of the Metals Research Laboratory and Head of the Department of Metallurgical Engineering, Carnegie Institute of Technology, Pittsburgh, Pa. (Additional). Dr. R. A. Wilkins, Vice-President, Research and Development, Revere Copper and Brass, Inc., Rome, N.Y. (Additional).

Scottish Industries Exhibition

The Scottish Industries Exhibition, 1949, takes place at the Kelvin Hall, Glasgow, September 1 to 17. This exhibition will be the largest trade fair ever held in Scotland. Its emphasis will be on actual buying and selling, and it will be fully representative of Scottish industry to-day. Approximately 320 Scottish firms will be occupying stands and trade buyers from all over the world will be welcome. Arrangements for their reception and hotel accommodation whilst on their visit to Glasgow are already well advanced and no buyer need have any qualms on this account.

RECENTLY SOME forty-six motor coaches were needed to take about 1,500 employees of J. Blakeborough & Sons, Limited, engineers and valve makers, Woodhouse Works, Brighouse, near Halifax, on an excursion to Filey.

Core-making at Coneygre Foundry

Development of a Quick-drying Core Binder

By A. R. Parkes

Several years' experimenting at the Coneygre Foundry, Limited, Tipton, under the direction of Mr. J. J. Sheehan* has resulted in the formulation of novel means of core-bonding and has led to attendant modification of core practice generally. In particular, the purpose of this account is not to describe the foundry, for this has several times previously been referred to in these columns [1 2 3 4], but to relate details of the methods developed for using a resin-type of core binder for which little heat or time is required in the drying; the binder has " air-drying " properties. The new practice, which was referred to briefly by Mr. G. L. Harbach in the discussion of his recent Paper[5], is the result of the search for a core-bonding material which would present a combination of *all* the desirable qualities of a core-binder without attendant disadvantages; the whole research being planned with this end in view. Nevertheless, core practice at Coneygre is not completely changed over to using the new material, because it is felt that so drastic a departure from the conventional should be a gradual process, changes being made only as the results of wider experience become available and as shop methods and layout can be revised to suit the new medium.

Air-drying Core-binder

The " air-drying " core-compound is a dark-red in colour, so that the resultant mixture with sand is easily identified in the foundry, where it is simply called " red " core sand. It is a moist powder which readily takes up water, but it is not strictly a " synthetic " resin. More correctly, one of the constituents of the compound is a natural gum resin. Of the four major components, one is of Empire origin and the other three are mainly produced in this country, so that problems of foreign exchange do not arise in connection with any importation. The requirements which have been satisfied for cores made with this material are: adequate " green " strength for core-making, both by hand and on the " blower "; rapid hardening for handling and setting; *hot* strength to resist metal wash and high pressures, good knock-out properties, good surface finish on castings, no fumes, and complete sand recovery. Up to the present time, the material has been widely used in iron-foundry practice (Coneygre Foundry mass-produces automobile cylinder blocks and miscellaneous associated high-duty castings), it has been adopted for copper-base alloys and light alloys (for magnesium alloys it combines readily with inhibitors in the sand) and it is being tried-out in one of the leading steel foundries.

* Junior Vice-President of the Institute of British Foundrymen.

Mixing

A clay-free, washed silica sand should be used with the " red " core-binder. Suitable gradings are as follow:

	Medium sand, per cent.	Fine sand, per cent.
Retained on B.S. Sieve 30	0.8	—
44	8.2	0.1
60	44.6	1.0
100	37.6	3.9
150	7.4	41.5
200	1.2	49.4
Passing through 200	0.2	4.1

Ryarsh (washed) or Sommerford sands are suitable examples. Moisture content is critical and a start should be made with dried sand unless there be means available to ascertain the actual moisture in each batch of sand. Very coarse sands are not so satisfactory for use with this binder. The normal percentage addition is 3 to 3½, but with extremely fine sand, with substantial percentages on 150 and 200 mesh, this may have to be increased to 5 per cent. or over; in these cases the green strength is increased and the dry strength somewhat reduced.

In making a mix, sufficient water to make 2 per cent. is added to the sand in the mixer and the machine is started and run until this is evenly distributed, then the red powder is added and mixing is continued for about 2 minutes, when the sand should have a green strength (compression) of 1.8 to 2.2 lb. per sq. in. At Coneygre the sand is delivered into the mill from stock through an overhead pipeline and weigh hopper above the mixer, water is measured-in mechanically. The " feel " of the sand is used by the experienced mill operator to determine optimum mixing; over-mixing should be avoided. The moisture is critical to ± ¼ per cent., too much makes the sand sticky and it " clogs " in use, too little gives inadequate green and dry strength.

Normally, no further additions are needed for good, workable core-sand. In hot weather, however, the sand toughens-up quickly on the bench and this can be avoided by a mill addition of about ¼ per cent. of linseed or fuel oil or proprietary core oil. For core-blowing, minimum green strength is advocated; this can be secured, without loss of dried strength, by using an addition of methylated spirit (about ½ to ¾ per cent.) in these mixes. The green strength to dry-strength ratio can be varied inversely in this manner—a feature not experienced with other bonding materials. To give enhanced stripping properties for complicated core-boxes, paraffin (to about ¼ per cent.) may be added to

Core-making at Coneygre

the mixture; soap solution may be used for cleaning and lubricating core-boxes.

Properties of the Mixed Sand and Cores

Foremost in the properties of the mixed sand is the ability to dry without added heat. Atmospheric drying for small cores takes from 30 minutes upward according to section. With the help of moderate heat, drying is accelerated, times from one minute being recorded. Temperature is not critical; any temperature from that of the atmosphere up to 260 deg. C. (500 deg. F.) may be used, and the drying time varies inversely with temperature but directly (as is normal) with cross section of the core. A 4-in. diam. core, 6 in. long, can conveniently be dried in an oven at 180 deg. C. in 15-20 minutes. Normal dry-strengths are 900 to 1,100 lb. per sq. in. in compression and 190 to 220 lb. per sq. in. tensile. The drying process is essentially one in which the presence of air and some removal of water are involved. For storage of the sand, it is therefore necessary to exclude changes of atmosphere and covered bins are advocated. Mixed sand may be stored overnight or even longer under such conditions. A corollary from this phenomenon is the effect of shop atmosphere; a warm, dry atmosphere accelerates curing, and a cold, humid atmosphere retards it. A core 3 × 4 in. may require five hours to air-dry in a January atmosphere, whereas in this country the same core will require only one hour in the month of June.

FIG. 2.—CORE-MAKING STATION ADJACENT TO THE MOULD CONVEYOR.

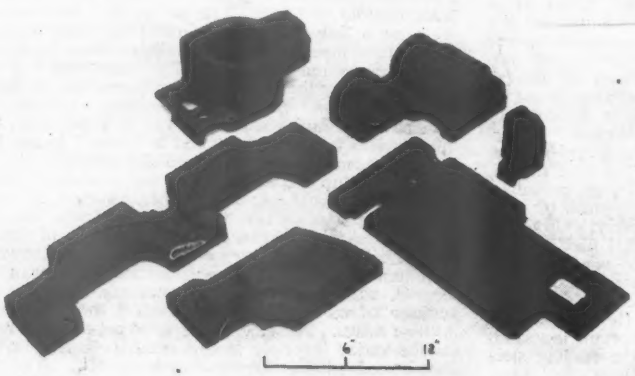


FIG. 1.—GROUP OF CORES, MADE IN "AIR-DRYING" SAND, DRIED IN 20 MINS. AFTER BLACKING.

Reclamation

No used mixed sand or broken cores or sweepings need be wasted; such material may be damped down and added to new sand in the mixture, though a maximum addition of 10 per cent. is suggested and the final figure of 2 per cent. water must be maintained. Similarly, used cores or stubs may be allowed to enter the moulding-sand system in any normal proportions, they are softened by addition of moisture and break up easily in the mill. This is a distinctive feature of this core-binder.

Following from the preceding paragraph, it might be thought that there would be a risk in leaving dried cores in a green-sand mould. The experience at Coneygre suggests that this factor is not serious, green-sand moulds with cores are sometimes held overnight for casting next day, without deterioration of the cores, though such moulds are not left for longer periods.

Flowability

The flowability and manner of working the air-drying core sand are similar to a linseed/cereal bonded sand. The same degree of overhang in cores may be permitted, though the new sand is

more plastic and there are usually no tell-tale cracks when sagging has occurred. This latter is a feature also of synthetic-resin cores. Cores are produced with a fine surface finish with complete absence of drying fissures.

Surface Treatment

In this foundry, the larger cores are usually blacked before being inserted into the moulds. With "red" cores this operation is carried out in the green state and, hence, one major operation, that of blacking drying, is eliminated completely. In the section of the foundry devoted to production of such cores, they are spray-blacked immediately after making and then pass on a steel band conveyor to a large vertical continuous core stove where, in a 20 min. at 180 deg. C. cycle (the stove drive has been speeded-up), both core and blacking are dried. A group of such cores is shown in Fig. 1. Additionally, it has been found that a water spray on the outside of the cores causes the binder to migrate to the surface and results in a harder skin on the core, which is often desirable. The spray blacking with a water suspension, therefore, serves a double purpose; sometimes trays of small cores are also water sprayed to produce this harder skin.

Production Possibilities

The value of the new material lies not so much in its intrinsic economies but in the re-arrangement which it permits in production layouts. Hitherto, cores have been made in a core shop separated from the foundry proper, to a programme scheduled prior to moulding operations, spaced by a day or more interval, in quantity allowing margin of safety, and necessitating repeated storing, handling and transport. It has been known in mechanised foundries for a line to be completely held up because of the absence, some days previous, of a specialised core-maker and the consequent lack of cores. The system now in use at Coneygre is completely revolutionary in this respect. There is no separated core shop; instead, core-making is complementary to and runs alongside moulding operations. It is possible for a core to be requested, made and dried within *two minutes*. Of course, the normal production is not run on such a hand-to-mouth basis, but there is a great reduction in core-making to moulding intervals, in storage, in over- and under-make. For drying cores, an additional continuous stove which had been envisaged because of increased business, has become redundant before being installed; this was solely the result of reduced drying time since the introduction of "red" cores.

A Typical Layout

This foundry has been previously reported to consist of a number of "small moulding units"[2] as distinct from a completely integrated mechanisation. The new core process has been adapted to this system. For instance, in one corner there is a pair of moulding machines serving a short straight length of roller conveyor leading to a pouring station. Alongside this conveyor (some 15 to 20 ft. long) is, in effect, the moulder's private core shop, for producing the fifteen cores which complete his mould. It comprises a partially covered bin for the "red" sand, a "Redford" bench core-blower (this model happens to be the first made in this country) a spillage tray and bin, a small bench, a water-spray equipment, a small gas-fired, tray-type core oven and a rack for finished cores; the whole occupying some 120 to 150 sq. ft. floor space. For these fifteen cores to each mould (the moulding machines produce at the rate of 25 moulds per hour), core-making is looked after by a man and a girl. The man "blows" the various cores, using interchangeable volume-cylinders on the machine. "Gang-type" core-boxes are used with the "Redford" machine to make from two to five cores per blow. The girl turns out the cores on a tray, sprays them with water, and places them in the oven, withdrawing a tray of dried cores at the same time. The tray of finished cores is placed on the rack. As soon as a new tray of cores is ready—at intervals of about 2 to 10 minutes—there is a tray of finished cores ready to come out of the oven. Green cores at the close of the day are left overnight to air-dry. The man

FIG. 3.—MOULD, COMPLETE WITH CORES, AT THE CORE-MAKING STATION ON THE SHORT CONVEYOR.

Core-making at Coneygre

who cores up the moulds on the conveyor track helps himself to handfuls of small cores or "sievesfull" of the larger ones as required. Small cores can be more-or-less "shovelled" up without damage, such is their hardness and strength. If he be short of a particular core of the fifteen, the moulder requests urgent supplies —*and they are forthcoming in a matter of* 2-10 *minutes*. It is detail integrated production *par excellence*. The sand bins, core bench, blower, oven and a tray of cores are shown in Fig. 2, and a mould on the short conveyor with its complement of cores is shown in Fig. 3. A group of typical cores made at this station is shown in Fig. 4. The core station is sheltered on two sides by a corrugated partition, otherwise it is just a corner of the foundry. Several similar stations, differing only in detail, are in use. Knocking-out is at the end of a return length of conveyor adjacent to the moulding machines (hence the box parts are immediately available for re-use). There is no smell or fumes from the cores after casting. Larger cores, to which reference has been made earlier, are made in a central section of the foundry and are dried in the speeded-up vertical continuous stoves. Experimentally, cores made in "red" sand have been stored for as long as 2 yrs. without deterioration.

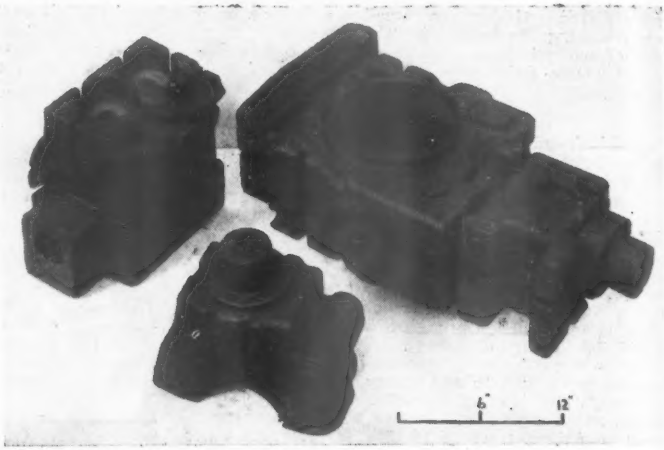


FIG. 5.—GROUP OF CORES BONDED WITH U.F. RESIN.

Alternative Materials

At this foundry "red" core sand is not used for all the production cores, though experiments are proceeding piece by piece with the range of castings made. Crank-case cores are at present the subject of investigations. Use is extensively made of synthetic-resin-bonded cores of the urea-formaldehyde type, particularly for cylinder bores and water jackets. None of the more orthodox binders is used. U.F.-bonded cores are also dried for 20 minutes after blacking, a typical group being shown in Fig. 5.

FIG. 4.—GROUP OF CORES IN "RED" SAND, MADE IN THE STATION ADJACENT TO THE MOULD CONVEYOR.

Knock-out Properties and Gas Evolution

With both the U.F.-bonded and the "red" cores knock-out properties are excellent. There is commendable absence of "finning" and sand burn-on and this much reduces fettling time. Castings in phosphor-bronze, normally much subject to "finning" and burn-on, are very clean when these core sands are used. Comparable figures for total gas and rate of gas evolution for various cores are given in Table I. There is no evidence of burn-on with metal sections up to 3 in. Normally, however, little trouble is experienced with sand burn-on at this foundry, for castings where there

is serious likelihood of such a possibility are made in zircon sand, which, though expensive, has proved a complete answer to such problems.

TABLE I.—*Comparable Rates of Gas Evolution and Total Gas for Various Cores.*

Type of core.	Total gas evolved (c.cs.).	Time for complete evolution (secs.).
3.5 per cent. Air-drying Bond ..	12	60
3.0 per cent. Linseed/Dextrin Bond	18 to 19	40
3.0 per cent. U.F. Resin Bond ..	14.5	20–25

Availability and Cost

The air-drying sand binder developed by Coneygre Foundry is marketed under the name Airbond* and is available in any reasonable quantities. The actual cost of the core powder is comparable with that of the more orthodox binders of the linseed oil or semi-solid type, but as has been shown, considerable economies may be effected in core-making and drying procedure, so that the final results of introducing the process are very favourable.

Acknowledgments

The writer thanks the Directors and Staff of Coneygre Foundry, and particularly Mr. J. J. Sheehan, for making this information available and for providing so much of interest during his visit to the foundry.

* Fordath Engineering Co., Ltd.

REFERENCES.

1 "Coneygre Foundry," by V. C. Faulkner, FOUNDRY TRADE JOURNAL, November 7, 1946, p. 231.
2 "A Small Moulding Unit," by A. Wood, FOUNDRY TRADE JOURNAL, March 2, 1944, p. 175.
3 "Problems in a Quantity Production Foundry," by J. Hird FOUNDRY TRADE JOURNAL, March 11, 1948, p. 243.
4 "Flowability of Moulding Sand with Special Reference to the Shatter Test," by E. L. Graham, FOUNDRY TRADE JOURNAL, April 15, 1948, p. 365.
5 "Synthetic Resin Core Binders," by G. L. Harbach, FOUNDRY TRADE JOURNAL, March 10 and 17, 1949, pp. 203 and 225.

hands of the publisher. The relative merits of the various alloys used in journal bearings have been investigated and attention is being devoted to improvements in manufacturing techniques. The results of some of this work, which have been published in the technical Press and in scientific journals, are summarised in a booklet entitled "Babbitt Alloys for Plain Bearings."

Solder

A new booklet, "Notes on Soldering," summarising the latest available information on the composition, properties, and mthods of using soft solders has been well received by the technical Press and over 10,000 copies have already been distributed.

Lectures have been delivered to technical societies and educative materials, such as films, lantern slides, lecture notes and collections of products, illustrating the uses of tin have been supplied to schools.

Publication Received

Report on the Work of the Tin Research Institute, 1947-1948. Published by the Institute, from Fraser Road, Greenford, Middlesex.

This well-illustrated booklet reviews the activities of the Tin Research Institute during the period of recovery from the special conditions imposed by the war and describes the wider activities envisaged for the future. These include more extensive research facilities and improved technical service for the tin consuming industries. During the past two years the Director and several members of the staff have visited America, France, Holland, Belgium, Switzerland and Italy to renew contacts severed by the war and to secure first-hand knowledge of local problems and conditions. The research and development teams have been strengthened by the appointment of senior investigators with experience in certain specialised fields, such as corrosion and electro-deposition.

Extensions and alterations now being made to the existing headquarters at Greenford will more than double the available laboratory space and provide much needed accommodation for the expansion of research and development work on tinplate, hot-tinning, bronze founding, bearing alloys and the electro-deposition of tin-alloy coatings.

Tin and Tin-alloy Coatings

The use of tin as a protective coating is its most important application. Corrosion stations, situated in six widely different parts of Great Britain and at three points in the United States, are being used to study the corrosion-resisting properties of tin and tin-alloy coatings under conditions likely to be encountered in service. It has already been shown that a thin coating of tin on steel is an excellent basis for paint and tin, or tin/lead solder; it is now being applied for this purpose to the edges of motor-car body panels. New methods of applying tin locally to steel are being investigated. Alloy coatings, containing 80 per cent. of tin and 20 per cent. of zinc, are being increasingly used for the protection of steel, particularly in the electrical field where their good corrosion resistance and excellent "solderability" are proving advantageous.

Research on electro-tinning has been intensified. A new plating bath is being investigated and affords a wider range of current densities than has hitherto been possible with still solutions. The hot-tinning laboratory has recently been equipped with modern industrial-size plant, suitable for investigating the problems encountered by tinplate manufacturers and tinners. A new booklet on "Hot-Tinning" has been completed and is now in the press.

Castings

The problems associated with the production of relatively small chill-castings have been solved and attention is being devoted to the continuous casting of bronze rods and tubes, and to the improvement of sand-cast bronzes. A comprehensive textbook by Dr. W. T. Pell-Walpole and Professor D. Hanson is in the

(*Concluded at foot of column one.*)

Radium and Radon for Industry

The Ministry of Supply announces that the Government-owned Radiochemical Centre at Amersham can now accept orders for radium and radon as sources of gamma-rays for use in industrial radiography.

Radiography with Gamma-rays.—Radiography, which is the most versatile of all non-destructive testing techniques, makes use of the penetrating power of electromagnetic radiations of very short wavelength. The two main types of such radiation are X-rays and gamma-rays. The penetrating power of gamma radiation is comparable with that of the most powerful X-ray apparatus at present available for industrial radiography. For some industrial purposes gamma radiography may be the more convenient or the only practicable method.

Radium and Radon as Gamma-ray Sources.—Gamma-rays are emitted by many radio-active substances of which radium and radon are the most widely used. Radium occurs in nature in association with uranium. Radon, which is a gas, occurs in nature as a decay product of radium, but for practical use it is extracted from radium in the laboratory. Although the gamma-rays associated with radium and radon are of identical quality, the elements have characteristic properties which distinguish them from the radiographic point of view:—(*a*) The intensity of radiation from radium may, for practical purposes, be regarded as constant, whereas that from radon decreases continually, falling to half its initial value in 3.8 days, and thereafter being halved in each succeeding similar period, and (*b*) the volume of 1 gm. of radium sulphate, which is the radium salt commonly used for radiographic purposes, is roughly 0.5 cub. cm. On the other hand, the volume of a quantity of radon equivalent in gamma radiation to 1 gm. of radium sulphate need not exceed a few cubic millimetres.

With regard to (*a*), although a source of radiation of constant intensity is often more convenient than one which is variable, the radon decay rate is nevertheless slow enough to enable a useful amount of radiographic work to be done with a single radon capsule. It is usually practicable to use radon until its activity has fallen to about one-quarter of the initial value, *i.e.*, for about a week, or longer in the case of a large amount. The regular fall of radon gamma-ray intensity permits calculation of exposure to be made with sufficient accuracy. With regard to (*b*), the sharpness of the radiographic image is directly related to the physical size of the radium or radon; therefore, for radiographs of equal resolution, radon can be used much closer to the object than radium, with a corresponding reduction in the exposure time. Thus, in some circumstances, accessibility, distance and speed factors would favour the use of radon.

The intrinsic value of radon is small compared with that of radium. For this reason radon is preferred to radium for some applications "in the field" where loss is a possibility, *e.g.*, if radium used for the inspection of ship welds were dropped overboard, a costly effort to recover it would be involved. Furthermore, less danger attaches to the accidental dispersal of radon than of radium, but, of course, the careless disposal of any substantial quantity of radioactive material, even of transient activity, would be serious.

General Information

Precautions with Gamma-ray Sources.—A firm, contemplating the use of gamma-rays for radiography for the first time, should at the outset consult the National Physical Laboratory, Teddington, Middlesex, on the safety precautions to be adopted. Essential safety precautions do not involve very much expense or difficulty. The Radiochemical Centre will supply free of charge pamphlets dealing with health precautions to all applicants for radium and radon. The Radioactive Substances Act, 1948, empowers the Government to make regulations to ensure safety in occupations involving the use of radioactive substances and irradiating apparatus. Until regulations are made, the Radiochemical Centre will ask applicants for gamma-ray sources to provide written confirmation that their safety arrangements are adequate.

Staff and Apparatus required for Gamma Radiography.—As in the case of X-radiography, the successful use of gamma-radiography requires trained staff, competent to interpret radiographs, and familiar with the special precautions necessary against occupational hazards. So far as is known, the Kodak School of Engineering Radiography, Wealdstone, Harrow, Middlesex, is the only institution offering training at present, but the Ministry of Supply is making inquiries from the Ministry of Education regarding the possibility of courses being started elsewhere. In general, the associated equipment is simple and, if properly designed, is safe to handle. The source of radiation is compact, so that the equipment is extremely mobile. It can frequently be made by the user firm.

Conditions of Supply of Radium and Radon Capsules.—The Ministry of Supply Radiochemical Centre at Amersham supplies radium and radon for industrial use. Applications should be addressed to the Radiochemical Centre, White Lion Road, Amersham, Bucks (telephone: Little Chalfont 2278-9), with a detailed specification of the capsule required. Consultation with the Centre will be necessary to ensure that technical requirements are met.

Radium (which is best suited to factories and foundries where there is a continuous flow of radiographic work) is supplied only on hire for periods of not less than six months. Capsules containing 50 mg. and 250 mg. of radium are in common use and the present rentals for these are £11 5s. and £56 5s. respectively per annum. The radium remains the property of the Ministry of Supply and is not transferable by the hirer. The hirer is also required to pay the cost of fabrication and testing of the radium and its container, at present averaging £20 for a 50-mg. capsule and £100 for a 250-mg. capsule. The average time needed to fulfil an order for radium is two months.

Radon is sold outright. Typical present costs are:—£15 for a 250-millicurie source, £20 for 500 millicuries, and £25 for 750 millicuries. One week's notice of an order is required.

Sources will be delivered by road or by express passenger train, packed in a way to comply with transport regulations. Delivery is charged for.

Production of Medium and Heavy Iron Castings*

Improvements for the Jobbing Foundry

By G. W. Nicholls

(*Continued from page* 528)

Metal Melting

The next operation is the melting of the correct grade of iron and then pouring at a temperature of between 1,280 and 1,350 deg. C., depending upon the design of the casting. The composition of the iron plays an important part in producing castings free from defects, particularly those of shrinkage, and particularly also in these days of pig-iron shortages. All shrinkage cavities are formed during the freezing or setting period of the molten iron and the metal composition determines the length of this period; the softer the iron, the longer the freezing period; and the harder the iron the shorter is the freezing period. By reducing total carbon, silicon, phosphorus and manganese and by increasing the sulphur, an iron with the lowest freezing period is obtained, but trouble will certainly arise due to lack of fluidity. The present-day tendency is for total carbon contents to be below 3.0 per cent. This composition is not applicable to general foundry practice and leads to difficulties. The important part which total carbon plays in the solidity of a casting, hinges unquestionably upon the cooling rate and casting section. With the same cooling rate and casting sections, an increase in the total carbon content brings about liquid expansion, which, in conjunction with a composition having a short freezing range, is an invaluable help in obtaining solid castings with a varying-section design.

Use of Steel Scrap

The use of high-total-carbon mixtures and the consequent increase in graphitic carbon, demands that low-phosphorus contents be used to obtain satisfactory toughness and good results. Low-phosphorus pig-irons, however, are not always available in the quantities required and, therefore, in order to obtain low phosphorus, extra steel scrap must be incorporated in the metal mixture. The importance of cupola control is thus increased, if constant results are to be obtained, the composition of the charge and the amount of carbon "pick-up" in the cupola during melting must be controlled.

Normally, the affinity of steel for dissolving carbon commences within the temperature range of 750 to 900 deg. C. The amount dissolved, either by diffusion into solid iron or dissolved by liquid iron, increases as the temperature rises and the time available for solution to occur lengthens. The factors are, therefore, the melting temperature, the rate of melting, and the time between taps; other factors, of course, influence this solubility, such as the composition of the iron and the nature of the coke charged. If high carbon be desired, then one should melt at a slow rate with an increased coke bed and a grade of coke more soluble in the iron should be selected. Also the well capacity of the furnace should be increased to enable greater time-intervals between taps. If low carbon be desired, then melting should be at the fastest rate possible, using a harder and more dense type of coke, which is usually less soluble in iron. The maximum amount of steel possible should be incorporated in the charge, and the time-intervals between taps should be reduced.

The method of furnace charging also plays an important part, but the ideal method will depend upon whether the furnace has a natural tendency to melt with a high carbon pick-up or a low carbon pick-up. If the former applies, the steel should be charged last, and if the latter, the reverse should be adopted. During the melting, no appreciable carbon pick-up will occur until the charge reaches the melting zone, although steel will commence to carburise at the 900 deg. C. zone, but it is between the melting zone and the well that maximum carbon pick-up occurs, being at the greatest rate during the fall of metal droplets through intimate contact with hot coke. The amount picked-up in the well is related to the time-interval between taps, and the temperature of the metal in the well.

Tapping and Pouring

After having melted the iron to the correct composition, it is not sufficient to guess at the total weight tapped. A portable weighing machine should be used; it is much safer to avoid short casts and prevent the melting of unnecessary quantities of metal. After the castings have been poured, a small quantity of molten metal is run through and allowed to flow off. The feeder bushes are then topped with hot metal and the casting is allowed to remain in the floor to cool for a few days before the top is removed.

Cooling

The cooling time depends on the design, as it is sometimes necessary to strip the top to remove some part of the core. In such cases, the casting is afterwards covered up again with sand and allowed to cool slowly over a period of 6 to 8 days. All precautions possible should be taken to ensure proper gradual cooling so as to avoid cracked or highly-stressed

* "Factors for Immediate Consideration in Assisting in the Future Production of Medium and Heavy Iron Castings," read before the West Riding Branch of the Institute of British Foundrymen, Mr. Hammond presiding.

Medium and Heavy Iron Castings

castings. The same principles and precautions are taken with castings of smaller tonnage made in moulding boxes, but often it is advantageous to alter the design slightly to give soundness beneath the risers.

Gating Technique

Molten metal on entering the mould gives up heat to the surrounding sand and the greater the distance it travels the greater the cooling effect on the metal. In very large castings, fast-flowing of metal occurs in parts, whilst in other parts the metal may remain stationary. It is evident, therefore, that it will be impossible for some parts to be "freshened" up with clean hot metal. These variations result in trapped gas and unequal times of setting, quite apart from the question of thickness. The choice of runners should be determined according to location, and the capacity for distributing and filling the mould with metal at as nearly possible uniform temperatures. Whether or not one utilises top or bottom running, depends on the types of casting.

Bottom pouring is the safest when working in green sand, but even this is not always the best. In all dry-sand work of cylindrical form, which must be machined, the best castings are produced by top pouring through a series of pencil gates. The metal is kept agitated, which prevents dirt or gases sticking to the sides of the mould and core, and at the same time allows a uniform shrinkage to take place. With top pouring, however, consideration must be given to the effect of the impact delivered by the metal when it first strikes the mould, and special sand or reinforcement of the sand must be used.

Very good results can be obtained by arranging, instead of one gate, a number of small gates of the same area. It is preferable to break up the gates wherever possible. There are times when a mould needs to be filled slowly and at other times quickly. It should be remembered, however, that rapid pouring necessitates good venting, and that a greater shock is delivered on the top part at the moment the mould is filled. Furthermore, it is bad practice to pour slowly a mould with a large surface area at the top, unless it is somewhat protected by cores, as, due to the mould being long subjected to a fierce temperature, the top will probably "pull in." Slow pouring is necessary when a mould contains thin cores. More time is thus given for escape of gases, but the metal must be hot.

Coremaking and moulding operations should be standardised. This helps in investigating defects and establishing the cause. It should also be remembered that every factor, however small, in foundry practice determines the final quality of castings and, therefore, merits the closest consideration and control.

DISCUSSION

MR. ALLARD asked if it would not be better to have just one vent pipe, thereby saving a risk of explosion in the coke bed.

MR. NICHOLLS. When moulding certain types of castings, it is often necessary to have a coke bed at two different levels, particularly with those castings with a wide side-projection. In this case it would also be necessary to have a vent pipe from each coke bed. He agreed that in cases where one coke bed only was used, one vent pipe should be sufficient, and would prevent any possibility of an explosion occurring.

MR. OLDERSHAW asked whether the vent wire was used in the bottom of these moulds. There was the ash bed and 6 in. of black sand, and a certain amount of facing sand between the casting and the ash bed, but Mr. Nicholls had not mentioned anything about venting down to the bed, and I wondered whether he had been able to cut out that operation which used to be general practice.

MR. NICHOLLS replied that the vent wire was definitely used on the bottom of heavy jobs.

MR. ALLARD, with reference to one of the faces that gave away under the weight of a core, asked if the strength of the mould was relied on to support the core, or was dependence made on core-irons.

MR. NICHOLLS said the specific remarks were applied to the cores, for no matter how well the cores were supported by the mould, if a weakness of the core existed within its internal structure, then considering that the ferro-static pressures within the mould acted in all directions, then there was always the possibility of the core itself collapsing.

Value of Records

MR. FORREST, although he had little to do with very large castings, endorsed Mr. Nicholls' remarks regarding keeping records. Where there has been trouble experienced in the early stages, the job may afterwards be forgotten for several years, and when it came round again, unless a record was made, it was possible to make the mistakes again. That was very easy under to-day's conditions when materials are changing, particularly types of iron and coke. In these days of make-do-and-mend with foundry materials, it was not too easy to progress in a straight-forward manner, and it helped if one had had previous experience.

MR. AITKEN asked the Author's opinion of rod feeding for heavy castings.

MR. NICHOLLS preferred to make all castings without applying rod feeding, but was not averse to rod feeding provided the person who was to carry out the operation was highly experienced in the art. Methods could be applied in the place of rod feeding by incorporating special heat-generating compounds, in the surface of the sand in the feeder head and down to the entrance of the feeder gate to the casting. Quite often a lot of feeding problems could be overcome by casting at the right temperature and applying a high head pressure of metal on the casting. One of the biggest failings that one found in normal foundry practice was the lack of thought behind the placing of feeders.

MR. HAMMOND referred to Mr. Nicholls' remarks about the contraction from the initial commencement of solidification to the final finished casting. Particularly with reference to the effect of cores inside the casting, with castings of a lighter nature, he wondered

whether during the process of solidification the effect of expansion of cores offset the shrinkage of castings, and in that connection he asked for the Author's observations on the different types of cores that were used; *i.e.*, oil-sand or loam, and their effects in retarding the normal contraction of the casting.

Sand Type and Quality

MR. NICHOLLS was not quite certain whether it would be best to use a loam or oil-sand core for the purpose mentioned by Mr. Hammond, but added that an oil-sand core had the advantage, which was not possessed by loam core, of collapsing after casting. A loam core might, in certain cases, be too rigid for a particular design and cause hot tears to take place.

MR. BOLTON, on the subject of sand, wanted to know whether natural or synthetic was used and also if coal dust was added in the facing sand.

MR. NICHOLLS said the sands were controlled. Each consignment of sand was checked for its normal physical qualities. He believed that in a jobbing foundry one type of sand could not always be used for the many jobs which were being worked. In his foundry to-day there were four different grades of sand. After many months of trying various sands, they finally decided that the best sand for heavy work was one of the heaviest and one of the coarsest, namely Scottish rotten rock sand. It was extremely difficult to get every condition perfect, but this sand gave more latitude and produced a sounder and cleaner casting. Coal dust was used for heavy work with large flat areas. In order to keep a check on the coal dust content, a sample was tested once every two weeks. The sand was dried at a temperature just below 100°C. and then ignited and from a calibrated chart the amount of coal dust present was determined.

A MEMBER assumed from the illustration that the down runners were dried and asked what method was used to ensure that they were dry.

MR. NICHOLLS explained the method was to seal up all the risers and the feeder heads and leave the runner open.

DR. FELL added his appreciation of Mr. Nicholls' Paper and emphasised the great importance embodied in the work of the moulder because he was in a position to study the effects of each mould on the ultimate casting. If a casting became defective, then he was also in a favourable position to ascertain the cause of the defect. One shape of casting was very different from another casting, that introduced variation, and other conditions also tended to vary, such as temperature and the size of castings and chills; all these features associated with the making of castings from the moulder's point of view made his work interesting.

MR. BURGESS asked Mr. Nicholls if in his opinion liquid shrinkage would be minimised by the addition of some innoculant.

MR. NICHOLLS said the answer was definitely yes. He found that one could help to reduce the shrinkage tendencies by the addition of inoculants. In the case of high-duty irons, it was important that the silicon content be in balance with the total carbon content. Shrinkage could be reduced by a late inoculation of ferro-silicon, but if the carbon content of the iron happened to be high, then such a course might cause precipitation of graphitic carbon of a type which would cause the casting to be very open-grained when machined.

Personnel Relations

MR. GRIMSHAW asked if the Author found the skilled workers were co-operative with up-graded men.

MR. NICHOLLS said the answer was rather difficult. It took a long time to overcome difficulties with certain sections of the men and to convince them that it was for their own good to have people come in to do certain work. The problem was tackled with a certain amount of give and take, the men realised someone had to get the castings out and that up-graded labour was probably essential, but they had not yet reached the stage when they thought foreign labour was essential. There were some men who seemed to be a little more level headed and very little objection was made from the older class.

MR. GRIMSHAW thought these conditions were due to fear of losing a job, but there was no reason to fear it during the next 10 years. Men had been brought up with that fear, and they had not lived long enough to eliminate it.

MR. NICHOLLS said the management always looked at its problems at a different angle from the men. In most cases the outlook of the management was to produce as many castings as possible with the minimum amount of discomfort to the men. Reference had been made to the younger men being brought up with fear of losing their jobs, but this, of course, applied in all other branches of industry. There was no one who could forecast the future, and it was this which might cause all young men to be concerned as to what was going to happen to them in later days. Recently they had not had much trouble with men about up-graded labour, all objections originally made had been mainly overcome, with the result that the up-graded men were doing a good job of work.

MR. HAMMOND asked if the Author had any use for a side feeder in connection with machine-tool castings, and also were there any instances where the casting had fed the riser, rather than the riser feeding the casting.

MR. NICHOLLS used the side feeder quite frequently on heavy jobs. He felt that the side feeder seemed to feed better than a top feeder direct, particularly if the branch arm connecting the down peg to the casting was kept as short as possible.

MR. FORREST asked if Mr. Nicholls used ceramic tiles. They were used underneath the riser to assist in breaking it off. The object was that the inserted piece should become incandescent and not impede feeding.

MR. NICHOLLS said he had never tried them.

MR. SQUIRES asked how many times were chills used, and with what they were coated to prevent them sticking.

MR. NICHOLLS said the chills were generally only used once, but in some cases might be used twice or even three times, provided they were clean and a proper dressing was applied. The dressing was a reasonable coat of blacking. They had tried other mixtures, but without much improvement.

Medium and Heavy Iron Castings

MR. FORREST asked if they ground the skin off the chills or machined them.

MR. NICHOLLS replied that on heavy work they were shot-blasted, and then inspected to see that each had a flat surface and was free from sand defects.

MR. COLLINGE requested information on the amount of camber used for a casting and the effect of chilling.

MR. NICHOLLS, regarding how much camber was put into a heavy casting, said it depended (*a*) on the over-all length of the casting, (*b*) the width, and (*c*) the depth. It also depended on the section of the whole metal down the side of the casting, and the amount of metal at the bottom. The amount of camber varied from ¼ to 1½ or 1½ in. On the bed 14 ft. long there was roughly ¼ to ½ in. used. With chilling one was bringing about the more uniform solidification throughout the casting and this affected the camber. The column casting was not chilled, but the correct grade of metal was obtained by control methods. On the bed casting of the type that was illustrated, the composition of the iron was modified to take into consideration the fact that chills were to be used.

MR. HAMMOND, with regard to metal mixing as distinct from using a chill to create a particular hardness, asked if there was any ratio for deciding the chill thickness according to the section of the casting.

MR. NICHOLLS said the ratio was about one to three; it depended on the type of iron to be used for the job.

Vote of Thanks

MR. SIMPSON, in proposing a vote of thanks to Mr. Nicholls, said it had been a unique lecture. Although Mr. Nicholls had touched on the manufacture of machine-tool castings, many of the points brought out would no doubt be very beneficial for other types.

MR. MILROY seconded, and said the lecture had been interesting and practical. If all put into practice what Mr. Nicholls had talked about we should go a long way in solving our problems. The 12 golden rules should be well considered, one was apt to overlook the obvious and blame the technician.

MR. NICHOLLS suitably replied and the meeting was closed.

RECENTLY, MR. JOHN CAMERON, J.P., past-president of the Institute of British Foundrymen and of the firm of Cameron & Roberton, of Kirkintilloch, celebrated his 80th birthday. In congratulating the doyen of the Scottish ironfounding industry, we are happy to report that he is hale and hearty. Recently, he gave a lecture on the early history of ironfounding.

THE TRADERS' ROAD TRANSPORT ASSOCIATION, the national organisation for C licence-holders, is bringing to the notice of members a suggestion that the names of owners should be stamped on vehicle wheels. This is because police experience has shown that, when spare wheels are missing, they are not necessarily stolen. Sometimes such wheels are lost off vehicles and never claimed.

British Standards Institution

The Monthly Information Sheet for April lists the following particulars of interest to our readers. Amongst "New Standards Issued" there are 1537: 1949 Nickel-copper alloy castings (2s.). This Standard covers composition, mechanical properties, moulding and freedom from defects, and specifies procedure for inspection, provision of test samples and the carrying out of tensile and priority tests. An appendix gives details of the information to be given by the purchaser in enquiries or orders; 1545:1949 Liquid toilet soap for general purposes (1s.). This covers unmedicated liquid toilet soap of general purposes quality and does not include special types for specific purposes. Methods for the determination of fatty acid content and free alkali are included; 1547:1949 Flameproof industrial clothing (materials and design. (2s.). This Standard applies to materials for flameproof industrial clothing. The Standard specifies a method of test for material; it deals with the effect of any flame-proofing treatment on the strength of materials; and gives requirements for the marking of material flameproofed with soluble deposits. Essential points of design are also covered and recommendations on maintenance are given; and 1548:1949 Analysed samples for metallurgical analysis. (1s.). This Standard covers the general conditions to be complied with in regard to the preparation, analysis, packing and storage of analysed samples, in order that they may qualify for the use of the B.S.I. certification mark.

Amongst "Draft Standards Circulated for Comment" there are CK 1234 Hand hammers, and CK 1524 Wrought iron chain slings (revision B.S. 781). (A copy of this draft can be obtained by subscribing members free of charge; subsequent copies and to non-members, price 5s. post free.)

Book Review

British Standards Year Book, 1949. Published by the British Standards Institution, 24/28, Victoria Street, London, S.W.1. Price 5s. post free.

Properly used, this book is invaluable to modern industry. The words "properly used" are stressed because cases arise where unintelligent buyers think to "cover themselves" by quoting quite inappropriate (and, maybe, obsolete) British Standards. Even those well versed in standards can trip-up, for each issue of the Year Book shows a very large number of changes. It takes nine pages alone to list the standards withdrawn. The section which should command the major interest of manufacturers is that devoted to work in hand, because at this stage either maker or user is at liberty to express his views. In order that the book may be kept up to date, provision has been made, by the incorporation of a pocket attached to the inside of the back cover, for filing the Monthly Information Sheets. This is a commendable innovation.

V. C. F.

Institute of British Foundrymen — *Birmingham Branch*

Naturally-bonded *versus* Synthetic Sands

*Sponsored by J. J. Sheehan, B.Sc., and W. B. Parkes**

Mr. J. J. Sheehan, B.Sc. (Vice-President of the Institute), opened his remarks by saying that he was taking the part of natural moulding sands, and that he had an advantage in that he and Mr. Parkes had both worked together on synthetic sands. Before Mr. Parkes and he could even differ they had to agree on definitions, and they had agreed that the differences between natural moulding sands and synthetic sands, while interesting and important in practice, were not wide in fact. They agreed that a workable definition of natural moulding sands would be:—

Natural moulding sands were sands found in deposits which contained both the silica grains and the mineral bonding material intimately mixed; whilst

Synthetic sands were a combination of silica grains and a mineral bonding material artificially mixed in proportions necessary to produce a mouldable material or mixture.

He said he was not very happy in the term "Synthetic" sand, but did not know of any other expression which would conveniently describe the artificial combination of (*a*) a natural deposit of silica grains, with (*b*) a natural deposit of bond, and they would be glad if someone could obtain a better definition. However, having agreed on the expressions as above, the discussion could proceed.

It was his intention to base his support of the more extended use of natural moulding sands upon the economy achieved thereby, *i.e.*, the economy of finding and using the sand and bond already mixed by nature at least up to the maximum physical capability of such natural mixtures. To sustain his proposition, it would be necessary to describe some natural deposits of such sands, their geological origin and location, their nature, their virtues and their limitations, and he felt that Mr. Parkes would certainly enlarge on the latter. He had to do this in a rather general way, but would like, if time permitted, to elaborate and particularise about that wonderful natural deposit, the moulding sands of the Bunter Pebble Bed area, known locally as the Bromsgrove red sands.

Nature of Sands

He had been helped very considerably by the Boswell memoirs dated 1918, and in these there were mentioned ungraded and graded sands. The first were of little economic use at present, but graded sands were rather more important.

Sands were the result of the gradual breaking down of rocks; by sun, heat, frost, rain, gravity and wind, and the movement of fragments of rocks from higher levels, they were broken up into constituent minerals, assisted by chemical action. Some were easily decomposed, but some were of hard mineral like quartz. The soluble materials were carried away, and the insoluble remained: (*a*) quartz grains and (*b*) insoluble clays. Thus (*a*) and (*b*) might be deposited together, or (*b*) might be separated by water currents or wind.

The most exact sorting was by air, but this was never perfect. Mr. Sheehan demonstrated by diagrams the delta conditions and dune conditions operating at Southport. That sand was very valuable, it had been rounded by water action and air action, and Mr. Sheehan's proposition was that there was a naturally-occurring deposit, naturally bonded and mixed, which had been separated into its constituent parts by natural action. Such deposits existed from Belfast and Scotland, through Cumberland and down to Devon. The Scottish sands had the added advantage of being combined with a very highly-refractory type of clay. Mr. Sheehan's point was, that nature had gone to a lot of trouble preparing this sand for us, and he thought more use should be made of it.

From this point, Mr. Sheehan proceeded to the economic considerations governing the choice of sands. This must be based on the cost of working, treatment and transport. He felt that natural sands did not get the consideration or the treatment they deserved. The same care bestowed on natural sand preparation as was usually given to synthetic sands would considerably enhance their value. He thought that milling at the quarry was possible, and should be considered, and that it was possible to select sands for their high clay content. In view of the dollar position and the undesirability of buying materials from abroad, it would be well worthwhile making a comprehensive survey of domestic natural-sand deposits, with a view to decreasing the necessity of the importation of bentonite clays.

Synthetic Sand

Mr. W. B. Parkes said that, first of all, he had to admit that he agreed with everything Mr. Sheehan had said—with reservations. Mr. Sheehan had not dealt at very great length with the difference between the synthetic materials and the natural materials, and he would like to examine this aspect.

As Mr. Sheehan had said, both the natural and synthetic sands could be divided into the sand-grain portion and the bonding material, but there were wide differences between both these constituents in the two types of sands, and there was a further difference in the method of preparation. In the synthetic sands there was a uniform-size, pure quartz grain with a very high melting point, whilst the chemical analysis of red sand showed an alumina content of about 3 per cent. and a fusion point around 1,200 to 1,300 deg. C.

*British Cast Iron Research Association.

Naturally-bonded versus *Synthetic Sands*

Grading.—The red sands were graded to some extent, but they had not been very well graded. It was very rare to find one with less than 7 or 8 per cent. remaining on a 200-mesh sieve, and that meant in practice that one would be limited to a permeability of 70 or 80. One point against natural sand was that it tended to crack when rapidly heated. This could, however, be overcome by selecting two sand deposits and mixing them.

Clay Grade

As far as the available clay deposits were concerned, medium- or high-strength clay could be obtained. When prepared, it was found that by using different types of clay, sand could be made hard, very hard, or of medium strength when dry. Therefore, with a synthetic sand, one could get a combination of properties which could not be obtained in natural sands. Mr. Parkes said that, generally speaking, as the permeability of a natural sand went up, the strength went down, whereas a synthetic sand could be produced giving any reasonable degree of both strength and permeability at the same time. With the naturally-bonded sand, one was restricted to a definite dry-strength/green-strength ratio.

Preparation of Synthetic Sands

With regard to the method of preparing the material, after 30 million years, he said, one would think the sand ought to be mixed, but the tendency of nature was not to mix sand and clay together, but to separate them so that the clay and sand in the red sands, mentioned by Mr. Sheehan, were not really well mixed. It was very difficult indeed to mix a damp clay with sand, so that, with most raw red sands which had been moulded and used in the foundry, one could still go and pick a proportion of the red sand grains out.

On the other hand, with the synthetic sands, one had the base grains and either a powdered clay or a clay slurry, the latter being the more satisfactory. In either case, mixing was comparatively easy. The next important point was that synthetic sand was most economical and easily controlled. It was possible to obtain any permeability from, say, 40 to 50 up to 1,000 with any combination, almost, of green and dry strength. This could be done by choosing the right type of clay and the appropriate base sand grains. Finally, he said that the sorting of the silica sands used for making synthetic sand had been very well done, as opposed to that for the red sands.

MR. SHEEHAN, in replying, said that Mr. Parkes's exposition was a very thorough one. He had attacked on the weakest front, namely, the red sand, on account of its lack of uniformity and refractoriness. Mr. Sheehan, however, defended the red-sand deposits and said there was nothing wrong with them. He agreed that, generally speaking, far too little attention was paid to this sand, and he thought that, if the costs were to increase, it would receive more attention. He did think that a variation of the properties which the red sands possessed could be achieved by scientific treatment, and this must be done by introducing the proper sand control.

Vote of Thanks

MR. BLYTHE, who proposed a vote of thanks to the speakers, said it could rarely happen that a Branch had the opportunity of bringing to its platform on the same evening two people of such technical eminence in this country. Whilst the talk would do a great deal of good, he would like to warn the speakers that they may be doing a corresponding amount of harm, in that all the people using naturally-bonded sands might be leaving the meeting with the idea that synthetic sands were the better, and *vice versa*, and a great deal of scrap might be caused in local foundries as a result!

Difficulty with Drying-out and Surface Finish

MR. WOOD, seconding Mr. Blythe's proposal, said that he expected Mr. Sheehan to be on the other side of the fence, and it was quite a surprise to him to find that he was on the side of the naturally-bonded sand, as years ago he used to work for Mr. Sheehan, who in those days was busily engaged in testing every known deposit of clay in the South of Ireland. He would like to ask Mr. Parkes if he could give any information on the drying-out of the synthetic sands, as he had experienced much trouble in that respect.

MR. DAVIS asked if Mr. Parkes could assure him that with light castings the finish obtained with the synthetic sand would be as good as the naturally-bonded sands.

MR. PARKES, in reply to Mr. Davis's question, said, unfortunately, with the silica sand a very fine finish was rare. As one would expect, natural conditions of washing away the clay, tended to wash away the fine grains, and most of the silica sands were too coarse to give a very fine finish on castings. A very fine sand was necessary to obtain this.

MR. LLOYD said that on a self-contained unit which did not carry a great deal of core sand, in the course of a very short time the sand tended to reduce in grain size with the continual burning, etc., and consequently the permeability was lost. He asked what percentage of new sand would Mr. Parkes advocate should be added to the basic sand to bring the permeability up to a satisfactory level.

MR. PARKES, in replying, said first of all that the experience of Mr. Lloyd was not very usual, the tendency in many instances was for the permeability to go up, not down. The sand grains were not very easily broken down, broken grains were fairly easy to spot, and he had often looked for them but had never found many. In a mechanised plant, the tendency was to lose them. The permeability was, therefore, likely to rise. If it did fall, then it was as a result of the coal dust present and possibly to some burnt clay, rather than the breaking down of the grains themselves. The dead clay could give a reduction in permeability.

Versatile Uses for Natural Sands

MR. DOLPHIN said he thought that Mr. Sheehan had not said too much about the advantages of natural sands, because he felt there were so many people who would say it for him, particularly in the Midland area where many were using them and making good castings. He had seen plenty of deposits of natural sands where

the sand did not vary as Mr. Parkes had said they did, and these deposits could be used for years. In a jobbing foundry, which was his particular interest, he had to make castings varying in weight from 1 oz. to 50 tons. He could imagine that Mr. Parkes would be puzzled if he was going to recommend the use of different synthetic sands for all these various jobs. The fact remained that there were many foundries in this country making wide varieties of castings, and using only one sand. His contention was, therefore, that a naturally-bonded sand was much the easier and more convenient from which to get the best results.

MR. HUNTER said Mr. Sheehan had told them of the results which could be obtained with naturally-bonded sands but what sand would he recommend be used with the Sandslinger when making flat work?

MR. SHEEHAN said he particularly wanted to impress on everyone the necessity for careful preparation and control of all sands, whether naturally-bonded or otherwise. If this was done, suitable sands could be prepared for any type of work. He had, in fact, in his own works, a system of transporting sand by air. This was only made possible because of the close control which was exercised.

MR. MYNALL asked for some views on the use of a combination of naturally-bonded and synthetic sands.

MR. SHEEHAN said that it was quite possible to do this, but there was very little written on this point even in Boswell. He said that in one change-over from naturally-bonded sand to synthetic sand, a semi-synthetic sand had been used very successfully.

Sands for Sandslingers

MR. TIPPER referred to Mr. Hunter's remarks regarding Sandslingers as he had found them very successful and they were used for some quite flat work, with a natural sand of moisture content 5½ per cent. This was, however, on light-alloy work, which might make a difference. Moisture was controlled, as was green strength—this at about 7 to 7½ lb.—and permeability at, roughly, 40. This plant ran for two years with no other addition than red sand; no coal dust was used. He would like to ask either of the lecturers a question on some of the more recent developments on synthetic sand mixtures. In one of the processes being used in the U.S.A. he believed that every sand was coded, and he would like to know their opinions of the possibility of this method spreading for some of the better class of work. The second point was the use in Norway of olivine as the basis of bonded sands and dressings, and he would like to hear what they had to say on the possibility of this being done in this country. Finally, he would also like to support everything that Mr. Sheehan had said about the better control of sand deposits. He, too, thought it could be done with very little increase in cost, and he certainly thought it was time that a survey was made of natural sands in this country, and, if the Institute could do this, he thought it should certainly be carried through as soon as possible.

MR. PARKES mentioned that he had seen Sandslingers at work using synthetic sands. With regard to the Westonite process to which he understood Mr. Tipper had referred, it was very difficult to say much about this at present. He knew something about it, but it would be some time before much information was available of a reliable character.

Critical Moisture Content

MR. DUNNING said the most damning thing that Mr. Parkes had told them about synthetic sand was his reference to their short moisture range. Since these sands were used very largely in mechanised plants where large quantities of sand were being passed around, it seemed to be that the drying-out was a drawback, and that an advantage was gained by the foundry using naturally-bonded sands, which could not be so readily upset. Finally, he understood synthetic sands had been first developed in the U.S.A. in foundries using mechanised plants, but Mr. Dunning had heard it said that the American foundryman would like to have access to British natural-sand deposits. They had to use synthetic sands because they simply could not obtain good naturally-bonded sands.

MR. PARKES said he could not agree with Mr. Dunning, as he thought the disadvantages of drying-out very greatly exaggerated. Although the red sands could be used with a moisture varying over quite a wide range, if the moisture content were too high, there was a likelihood of a considerable quantity of scrap. He added that, if they tried to define and explain the properties of every clay or of all the base sands which could be used, they would never finish the discussion.

MR. BLYTHE said he would like to have from Mr. Parkes a direct "yes" or "no" to the following question: He had no doubt at all that some castings made by some people could be made successfully in "unnatural" sands, but the question he wanted to ask Mr. Parkes was that, if he was presented with the problem in a foundry, a foundry which was making fine castings successfully and efficiently in naturally-bonded sands, would he advocate a change-over to synthetic sands, and, if so, why and on what grounds?

MR. PARKES thought that it depended on the castings. If he were placed as Mr. Blythe was, and was making small castings perfectly satisfactorily, he would not change, but, on the other hand, if he were making engine or automobile castings, and he found that a man took 30 min. to make a mould, and a further 3 min. were required solely to vent it, then he would want to change over.

"Controlled" Sand the Primary Requisite

MR. SHEEHAN thought that they had to admit that it was not the naturally-bonded or "un-naturally"-bonded sands they wanted in the foundries, but, frankly, a *controlled* sand. That was the whole point of the discussion. He was quite prepared to hear evidence for and against, but in view of time; his justification for the defence of naturally-bonded sands was the fact that he wanted to make a defence for sand control. If they would try to institute a kind of sand control for, say, Mr. Blythe's sands, the justification for it might not be immediately obvious, but taking all things into consideration, he would find that, whether he used natural sand or synthetic sand, there would be a great deal of justification for sand control, and that was the point he wanted to make.

Naturally-bonded versus *Synthetic Sands*

MR. MARSH said, with regard to the drying-out of the synthetic sand, was there any chemical added to the sand to retain the moisture?

MR. PARKES replied that something could be added, for example glycerine, but this was very expensive. He did not recommend inorganic salts, as they had rather an unpredictable effect on the clay bond.

MR. HOWELLS, JUNR., mentioned the point of using unskilled labour, and said it was very difficult to get unskilled men to vent the moulds, and there was an advantage in synthetic sands in this respect: they did not require so much venting.

MR. MCCLELLAND said he would like an opinion in the case of alloy-steel castings. Supposing, for example, when casting a 30 per cent. chrome steel at a very high temperature, they had used a synthetic sand and naturally-bonded sand, and also had used both together; what would be the result expected?

MR. SHEEHAN said he had cast alloy steel in synthetic sand, provided with a little yellow ferrous oxide on the grain. It had been a very successful experiment and he did not remember having had any trouble at all. The mixture they used was powdered ball clay and Leighton Buzzard 26A. sand.

Census of Users

MR. HIRD, in bringing the debate to a close, said that it was not practicable to take a vote on a discussion of this sort, but he did feel that there were more people using naturally-bonded sands than synthetic sand, and he thought it would be interesting to have a show of hands indicating the proportion into which these two groups fell. The show of hands indicated that about 60 per cent. of those present used naturally-bonded sands.

Training Films

It is obvious from a Report published in Industrial Management Bulletin No. 38, issued by the Council of Ironfoundry Associations, that the training film and film strips service which they organise is becoming increasingly popular. A country-wide survey has been made, and everywhere there are reports of well-attended meetings and promising results.

New Welding Chart

The Suffolk Iron Foundry (1920), Limited, of Stowmarket, have just issued a novel welding chart. By means of a window and an internally-disposed moveable table, no fewer than 600 items of information are disclosed. The container, moreover, carries much additional tabulated data chosen for its special interest for welders. The chart is priced at 2s. 3d., but those genuinely interested in welding may receive one copy free of charge.

A CONVENTION OF THE JOINT IRON COUNCIL will be held in London on October 19, 1949. Members are asked to reserve the date, pending receipt of further details.

Old Cast-iron Structures

The April issue of "The Structural Engineer" carries an interesting article by Mr. S. B. Hamilton, M.Sc. Amongst the more outstanding paragraphs there is one dealing with "rust cement." It reads: "Meanwhile, the galleries of the British Museum had been completed around a great courtyard in which, in 1857, the reading room and book stores were erected. The great dome, 140 ft. in diameter, is carried by cast-iron columns. The main member of each column is of I-section with its web radial to the dome. Two smaller I-sections, erected with their webs at right angles to that of the main member, were bolted together through holes in the main web. No attempt was made to fit the three members together. A gap deliberately left between the castings was filled with 'rust cement,' a paste of iron filings, sal ammoniac, and water, which swelled as it set and so, with the bolts, bound with the three uprights into a single column of cruciform section. Rust cement is reputed to be the invention of William Murdock, 1754 to 1839, when in the service of Boulton & Watt . . . . it proved a more satisfactory jointing material than sheet lead or molten lead, which have also been used for jointing castings."

New Catalogues

Barrier Creams. Innoxa Laboratories, Limited, Balls Pond Road, London, N.1, have sent us an interesting brochure entitled "Occupational Dermatitis." It details the occurrence of dermatitis and outlines the properties of a range of barrier creams for its prevention. It is a subject of real interest to our readers, and the pamphlet under review is available to them on writing to the Innoxa Laboratories.

Tool Steel.—Wm. Jessop & Sons, Limited, Brightside Works, Sheffield, and J. J. Saville & Company, Limited, Triumph Works, Sheffield—two concerns which are very closely associated—have issued a very well produced catalogue covering special alloy and tool steels. The range of these goods is, to the layman, quite bewildering, and no fewer than 114 pages are needed to detail their composition and properties. It might be thought that there must be room for a reduction in the quantity of brands, yet their need is shown in each case by typical uses. As industry develops and postulates new requirements, then there are repercussions in the demand for special steels, and, through their research department, a new Jessop-Saville steel comes into being and is made generally available. Realising this, the compilers of this catalogue have included a very detailed Buyers' Guide. Thus foundrymen requiring steel for parts of their die-casting machines, for chisels, saws, pattern-shop tools, roll turning machines and the like will, on turning to the page indicated, find the fullest technical data. The reviewer congratulates those concerned in having so materially enriched the trade literature of tool steel by the issue of this catalogue.

Heavy Demand for Nickel

Canadian Company's Improved Processes

Mr. Robert C. Stanley, chairman of the International Nickel Company of Canada, Limited, told shareholders at the recent annual meeting at Toronto that great improvements had been made in the company's processes during the past year. "In every particular we are well prepared to meet future demands of the world nickel markets," he said. An exceptionally high peacetime demand for nickel, the company's principal metal, continued throughout the year. The company's world sales of nickel in all forms in 1948 were 240,098,274 lb., compared with 205,278,868 lb. in 1947. Over 90 per cent. of this total was consumed in the United States, Great Britain and Canada. Consumption outside of these three countries was only a small fraction of pre-war volume.

Mr. Stanley said that the company was the world's largest producer of nickel, the leading producer of platinum and palladium, and it was fifth among the world's copper producers. Other metals extracted in limited quantities from the same ore were gold, silver, ruthenium, iridium, rhodium, selenium, tellurium and cobalt.

Wartime demands placed a heavy drain on the ore reserves of most metal producers. In the case of nickel the necessity of mining underground ores of considerably lower grade than in the pre-war years resulted in an upward trend in costs. This trend was further accentuated by the increased costs of supplies, services and labour. In spite of the many plant and process changes introduced to effect economies, an upward revision in the price of nickel became necessary.

Production in the plants in Great Britain showed a progressive increase during 1948. An additional nickel salts department was brought into production in September at the Clydach (Wales) refinery. At the Wiggin rolling-mill plant in Birmingham, and the Zenith extrusion plant in Glasgow, output and sales reached high figures. Production of platinum metals and gold at the precious metals refinery at Acton was at an all-time high in 1948, exceeding that for 1938 by 13 per cent.

U.S. Tariff on Copper Imports

Demand for copper during the year remained firm, said Mr. Stanley. The company's refined copper sales in 1948 were 219,130,830 lb., compared with 220,671,157 lb. in 1947. About 52 per cent. of the copper was sold in Canada and 48 per cent. exported in 1948. In again urging the permanent removal of duties on copper and nickel from the United States statute books, Mr. Stanley said that the U.S. tariff on copper imports continued as a handicap against Canadian producers. The copper tariff had been suspended temporarily, but should be removed permanently for the mutual benefit of American consumers and Canadian producers. The remaining 1¼ cents U.S. duty on refined nickel was also a trade obstacle which they must strive to have removed.

The chairman announced the virtual replacement of the Orford process of copper-nickel separation by the matte casting and flotation operations in the new nickel-oxide sinter plant. This had been a process change of major significance. The transfer of sintering operations from Port Colborne to Copper Cliff would soon be completed. Further progress had been recorded in the flash smelting of nickel and copper flotation concentrates with oxygen.

During the war, he said, the British subsidiary, the Mond Nickel Company, Limited, produced carbonyl iron powder for the Government. The Mond Nickel Company had now purchased the plant, constructed by the Government for the manufacture of this powder, to meet a considerable peacetime demand in Great Britain. Iron powder made by the carbonyl process had unique electro-magnetic properties which were of value in electrical and radio engineering.

In Canada, Great Britain and the United States, the production of alloy engineering steels was maintained at high levels throughout the year. The total for the three countries was approximately 9 million ingot tons, of which it was estimated around 40 per cent. contained nickel. The combined production of stainless steel ingots in Canada, Great Britain and the United States reached an all-time peak. Total volume was approximately 700,000 ingot tons in 1948. With about two-thirds of this volume in the chromium-nickel grades, a demand in excess of 40,000,000 lb. of nickel was created, roughly 50 per cent. of the total nickel consumed by the wrought-steel industries in the three countries.

High-temperature materials furnished an outlet for nickel in the aircraft industry. The gas-turbine industry in Great Britain had been very active during the year and progress had been made with several new developments in which the Nimonic alloys, produced at the company's Wiggin plant, had been prominent. Nimonic 80 and 80A still remained the standard accepted alloys for the rotor blades of all turbo-jet and turbo-prop aircraft engines in present production. "Last year I mentioned the development of a 70 per cent. nickel alloy, Inconel X, by our Huntington Works for applications in the gas-turbine and jet-engine fields," said Mr. Stanley. "This alloy was produced during 1948 for application in gas-turbine rotors, blades and bolts, where strength and resistance to high temperatures are essential."

Mr. R. L. Beattie, vice-president and general manager of the International Nickel Company of Canada, has announced that, with effect from June 1, production is being curtailed by reducing the number of men employed by 1,000 to 11,000. In common with the decreased demand for zinc, copper and lead, sales of nickel have fallen off by about 20 per cent. from the first quarter average of this year.

WORK HAS COMMENCED on the construction of Europe's largest oil refinery, being built by Anglo-American Oil Company, Limited, at Fawley, 15 miles south-east of Southampton. The output of the new refinery will be over 5,000,000 tons a year, compared with 800,000 tons at present. The plant is expected to cost approximately £37,500,000 and to take about three years to complete.

Obituary

MR. KARL ARNESEN, a director of Arnesen, Christensen & Smith, Limited, consulting engineers, of Newcastle-upon-Tyne, has died at Amsterdam. He was 48.

MR. JAMES PEACOCK MACKINNON, general manager and a director of the Scottish factories of Frederick Braby & Company, Limited, structural engineers, etc., has died at the age of 67.

MR. JOHN INNES MELVIN, managing director of Bertrams, Limited, general engineers and ironfounders, of Edinburgh, died on May 25. He was 68. Mr. Melvin, who entered the employment of that company in 1896, was appointed secretary in 1928 and managing director in 1945.

MR. JOHN HENRY JONES, joint managing director of the Sinclair Iron Company, Limited, Ketley, Wellington, Shrops, a subsidiary company of Allied Ironfounders, Limited, died at Shrewsbury on May 28. Mr. Jones, who was 62, joined the company as a young man in 1907; he subsequently took over the commercial management before becoming managing director in 1937.

DR. NORMAN ROBERT CAMPBELL, who died at Nottingham recently, joined the staff of the National Physical Laboratory at the outbreak of war in 1914. Five years later he joined the staff of the research laboratories of the General Electric Company, Limited, with which he served until 1944. He was the author of many books and scientific papers. Dr. Campbell was 69.

MR. JOHN LEONARD HOLMAN, chairman and joint managing director of Holman Bros., Limited, mining and pneumatic plant specialists, foundrymen, etc., of Camborne, Cornwall, died on June 1. He was 62 years of age. Mr. Holman, who was vice-chairman of the School of Metalliferrous Mining at Camborne, was also a director of East Pool & Agar, Limited, the Cornish mining concern, the Cornwall Boiler Company, Limited, Holman Bros. (Australia), Pty., Limited, Melbourne, Holman Bros. (Pty.), Limited, Johannesburg, and Holman Machines, Limited, Montreal, and other companies.

U.S. Machinery for Stewarts and Lloyds

The Economic Co-operation Administration last week announced approval of an allocation of $2,730,000 (£682,500) to Britain for the purchase of machinery to expand the plants of Stewarts and Lloyds, Limited, at Corby, Clydesdale and Tolcross. The machinery, which will be bought in the United States, includes electric weld tube-making equipment and a giant "walking drag line" for extracting iron ore at Corby.

An additional $2,000,000 (£500,000) may be earmarked out of future E.C.A. appropriations to help in the modernisation of the strip mill at Corby to increase its output of tube strip by 170,000 tons per year. The other equipment just authorised for Corby will increase output of continuous weld tube by 80,000 tons and of electric weld tubes for boilers by 50,000 tons per year.

Siemens Bros.' Working Capital

The accounts for 1948 of Siemens Bros. & Company, Limited, electrical engineers and contractors, of Woolwich, London, S.E.18, show that the group current assets have risen from £7,773,719 to £8,837,865 during the year, mainly due to the increase in materials, etc.—from £4,662,923 to £6,055,034. Dr. Henry R. Wright, the chairman, states in the report that the figure is considerably more than the total issued capital of £4,000,000, and adds that while the expansion of production continues, the value is likely to increase still further.

The group's total liabilities this time include a bank overdraft of £914,396. The chairman explains that the financing of increased stocks considerably affected cash resources. He adds that with high taxation "it is not possible to retain out of profits earned anything like sufficient working capital for the needs of the business, particularly when a large amount of cash is required to meet increasing costs of production, and at the same time further expand manufacturing facilities.

Purchasing Efficiency

The importance of an efficient purchasing department in any organisation could not be too strongly emphasised, said Mr. N. R. R. Brooke, a director of Guest, Keen & Nettlefolds (South Wales), Limited, when he spoke at a recent dinner of the South Wales branch of the Purchasing Officers' Association. The sellers' market conditions which had prevailed for the last 10 years were now fast disappearing, he said, and buying was no longer a question of obtaining delivery on almost any terms. He therefore particularly welcomed the Association's education and training scheme, which would enable young buyers to be given valuable theoretical training to supplement their practical experience. Above all, he said, the purchasing officer must be a diplomat, willing to co-operate to the very fullest extent with the other branches of management. If buyers generally would refuse to take shoddy goods at high prices, they would have a most important influence in raising the standard of the nation's products.

Gazette

THE PARTNERSHIP BETWEEN Tom Timperley, The Bungalow, Oldfield Road, Stannington, near Sheffield, and Charles Benjamin Hoole, 18, Alms Hill Road, Sheffield, carrying on business under the style of Timperley & Hoole at Sintaloy Works, Wentworth Road, Penistone, and Hurlfield Engineering Company, at 998, City Road, Sheffield, has been dissolved. Debts will be received and paid by C. B. Hoole, who continues.

THE COMPANIES' REGISTRATION OFFICE gives notice that the undermentioned companies have been struck off the register and are thereby dissolved:—STANLEY AUTOMATIC MACHINE COMPANY, LIMITED; VOLCANO BOILER, LIMITED; GEE PUMP COMPANY, LIMITED; HERSHAW ENGINEERING COMPANY, LIMITED; BRITISH BALOR GEARS, LIMITED; COGA PATENT CATCH COMPANY, LIMITED; SPRINGFIELD ENGINEERING, LIMITED; T. & M. MOTORS, LIMITED; WINDSOR MACHINE COMPANY, LIMITED.

A State Service to Exporters

Publicity Overseas

The Central Office of Information, at the request and under the guidance of the departments concerned with publicity overseas, produces material publicising the achievements of British industry in general and the excellence of particular products. This material is supplied to the information officers attached to H.M. missions abroad, High Commissioners' offices, and to Colonial governments, who are responsible for its distribution among newspapers and radio services in their territories. The material sent to each country is related so far as possible to the conditions in the country and to trade prospects, and is adjusted to meet new demands and opportunities as indicated by reports from the field.

Daily wireless transmission overseas of the London Press Service includes a 1,000-word programme of industrial and economic publicity, which is received by the majority of overseas posts. A fortnightly bulletin supplies commercial and economic articles in popular style. Copies are supplied free for overseas clients of commercial companies in Britain. Various photographic services are provided, all of which are popular in appeal and designed for the general magazine—and newspaper—reading public.

A 48-page survey of developments in home affairs is printed and distributed weekly to overseas posts. It can be offered, in translation, if necessary, to the trade or general Press. Facsimile reproductions of published articles of technical and scientific interest selected from British journals are made in the form of technical clipsheets. These are used by information officers overseas in a variety of ways, principally by circulation to editors who may be interested.

Films designed to help the sale of British goods abroad are made in consultation with the industry concerned and the Board of Trade or the Ministry of Supply. The films are distributed through the information officers at H.M. missions abroad; in some cases they are shown in public cinemas, in others to groups of interested people by means of 16 mm. projectors. Tours to industrial establishments are arranged for foreign visitors, including parties of journalists.

Manufacturers and exporters who think they have an interesting story to tell, and one whose telling overseas might bring further trade inquiries, are invited to get in touch with the Information Division, Board of Trade, I.C.I. House, Millbank, London, S.W.1. The sort of material most in demand is that concerning new products and processes, or large and unusual export orders, but any other ideas will receive prompt consideration.

WHEN THE CHAIRMAN (Mr. D. D. Frame) and directors of the Hammond Lane Foundry Company, Limited, and associated companies entertained about 60 members of the office and works staff at dinner at the Central Hotel, Dublin, the chairman thanked the staff for its loyal co-operation and said he thought they had weathered the storm. Plans had now been made for improvements in the company's products.

G.K.N. Seeks Permission for Ordinary Issue

Approach to the C.I.C.

Intimation that Guest, Keen & Nettlefolds, Limited, is seeking permission from the Capital Issues Committee to make an issue of ordinary shares of the parent company to provide approximately £4½ million new capital for the group is made by Mr. J. H. Jolly, chairman and managing director, in his statement circulated with the annual accounts. He points out that capital expenditure sanctioned for the United Kingdom companies of the group and unspent is over £7,000,000, excluding John Lysaght's Scunthorpe Works, Limited, for which finance has been secured. Resources available in the United Kingdom towards the £7,000,000 are approximately £3½ million. Permission is being sought from the Minister of Supply to "hive off" certain parts of the wholly owned subsidiary Guest, Keen & Nettlefolds (South Wales), Limited. This would remove from nationalisation its activities which are outside the terms of the Steel Bill, while leaving the rolling mills for transfer to the State.

Regretting the board's inability to give an account of its stewardship without having to refer to political affairs, Mr. Jolly reiterates its unabated opposition to the Steel Bill in principle, as also "to its confiscatory financial details." The directors would be failing in their duty to workpeople and the country, he says, if they did not emphasise "that it is our definite and unanimous opinion that nationalisation will not lead to greater production, cheaper production, or better quality."

New M.-V. Works at Motherwell

Welcome for Company's Enterprise

A new works for the Metropolitan-Vickers Electrical Company, Limited, and Newton Victor, Limited, was opened at Motherwell on May 24. Mr. Thomas Johnston, chairman of the North of Scotland Hydro-Electric Board, speaking at a dinner at Glasgow that evening, welcomed the new enterprise to Lanarkshire, a county which for a variety of reasons was passing through the doldrums and which, he said, at one period seemed to have a dismal future. Mr. Johnston told his audience that the Hydro-Electric Board was engaged on a large-scale industrial revolution which had no counterpart in history since the introduction of the railway system. When the scheme the Board had in view was completed it would be producing power to the extent of one-seventh of the power resources of Britain. At the moment, 15,000 new consumers of electricity in the Highland area were being added every year.

After making a tour of the new works, Mr. Oliver Lyttelton, M.P., chairman of Associated Electrical Industries, Limited, paid tribute to the value of the contribution being made to industry in the West of Scotland by the Metropolitan-Vickers Electrical Company, Limited.

News in Brief

CONDOR IRONWORKS, LIMITED, has had plans approved to extend its works at Oldham.

THE Croydon Manufacturing and Industrial Exhibition is to be held under canvas from July 7 to 16.

THE BOARD OF TRADE has made an Order, effective on June 13, reducing the maximum prices of ground sulphur by 14s. per ton.

THE NORTH-EASTERN SCRAP SURVEY sent out 4,000 reply-paid postcards to farmers in the area with a view to the collection of scrap from the farm lands of the North. Only 127 replies were received.

THE SUBMARINE Varangian, built by Vickers-Armstrongs, Limited, Walker-on-Tyne, has been brought to the Tyne for breaking up by J. J. King & Company, Gateshead.

THE LONDON OFFICE of the Metropolitan-Vickers Electrical Company, Limited, is being transferred from Kingsway to St. Paul's Corner, 1-3, St. Paul's Churchyard, E.C.4 (telephone: City 5757).

THE HUDSON SCOTT & SONS branch at Carlisle of the Metal Box Company, Limited, has celebrated the 150th anniversary of its foundation. A dinner to mark the occasion was attended by 200 people.

APPLICATION HAS BEEN MADE to the Capital Issues Committee by the directors of Babcock & Wilcox, Limited, engineers and boilermakers, etc., for permission to issue new preference and ordinary capital.

MR. B. ROBINSON, production manager of the Park Gate Iron & Steel Company, Limited, Rotherham, speaking at the annual dinner of the firm's first-aid service, revealed that the company is contemplating big developments at the works.

FOR THE FIRST TIME since before the war, an empty shipbuilding berth will shortly be seen on the Tyne. In July, John Readhead & Sons, Limited, South Shields, is to launch the Tregothnan, but there is no new ship to be laid down on the berth.

THE COMMISSIONERS OF INLAND REVENUE have authorised relief from U.K. income tax in respect of Canadian tax for the three years ended April 5, 1947, for holders of common stock in the International Nickel Company of Canada, Limited.

WITH THE PROMISE of shipment before the end of the year, the Cargo Fleet Iron Company, Limited, Middlesbrough, has booked orders for 10,000 tons of flat-bottom rails for the New South Wales Government railways and 5,000 tons for Victoria.

THE PARTY attending the launch of the 3,600-ton tanker Gastrana at the South Bank yard of Smith's Dock Company, Limited, saw also the laying of the first keel plate in the vacated berth of the biggest tanker which has ever been built in the yard.

TO MARK THE OCCASION of the company's 50th anniversary this year, Mr. R. R. Stokes, managing director of Cochran & Company Annan, Limited, boilermakers, has announced that a jubilee bonus of a week's wages to all employees will be paid on July 1.

THE DIRECTORS OF the Expanded Metal Company, Limited, West Hartlepool, have decided to recommend that free reserves amounting to £28,000 be capitalised as an issue of 5s. ordinary shares to ordinary stockholders in the proportion of one for five.

STEEL'S ENGINEERING PRODUCTS, LIMITED, manufacturers of mechanical handling plant, etc., of Sunderland, has received an order from Australia valued at £50,000. Substantial orders have also been obtained in connection with the construction of new oil-pipe lines in the Middle East.

IN HIS STATEMENT accompanying the annual accounts of Ideal Boilers & Radiators, Limited, the chairman, Mr. H. W. Carr, refers to the programme for extending manufacturing facilities at Hull, as a result of which, he says, "we look forward to a further increase in turnover during the latter part of 1949."

THE DIRECTORS OF Dowty Equipment, Limited, manufacturers of aircraft equipment, of Cheltenham, propose to increase the authorised capital to £400,000 by the creation of 800,000 5s. shares prior to the issue of a capital bonus in the form of one 5s. share for every four held. The present issued capital is £200,000.

THE TEAM from the drop-forging industry which is to study production methods in the United States recently toured Sheffield and district works. Works visited included those of the English Steel Corporation, Limited, Daniel Doncaster & Sons, Limited, Ambrose Shardlow & Company, Limited, and Firth-Derihon Stampings, Limited.

A SCHEME under which the capital of Richard Crittall & Company, Limited, heating and ventilating engineers, is to be written down by £500,000 to £50,000 was approved last week by Mr. Justice Wynn-Parry in the Chancery Division. The capital of the company consisted of 500,000 preference £1 shares and 1,000,000 ordinary 1s. shares.

LORD DUDLEY GORDON, chairman of Hadfields, Limited, Sheffield, told a meeting of manufacturers at Liverpool that he had sent a personal letter to each of the stockholders—numbering over 6,000—asking for approval or disapproval of the action of the board in opposing the Iron and Steel Bill. Only 14 out of the 6,000 had disapproved.

THE QUEEN ALEXANDRA DOCK lock at Bute Docks, Cardiff, has now been restored to normal working following the renewal of the outer lock gates. The new gates were constructed by Vickers-Armstrongs, Limited, at Barrow-in-Furness. They are of an all-welded design, which has resulted in a saving in the weight of steel of 100 tons.

THE CHAIRMAN OF Imperial Chemical Industries, Limited (Lord McGowan), speaking at last week's annual meeting, said it was the board's view that I.C.I. was not an appropriate subject for nationalisation. He spoke of the disturbing effect of veiled threats of nationalisation on both home and overseas markets of a large industrial concern.

THE DIRECTORS OF Gaskell & Chambers, Limited, brassfounders, etc., of Birmingham, having obtained C.I.C. consent, have decided to issue 173,672 ordinary 5s. shares at 32s. 6d. each to ordinary stockholders registered on May 26 in the proportion of two for five. Preference stockholders will be given the opportunity to apply for any shares not so taken up.

KENRICK CIA., LTDA., Casilla 127, Santiago, Chile, desires to represent a U.K. manufacturer of Diesel engines of up to 500 h.p. Interested firms should communicate direct with Kenrick Cia., Ltda., at the above

address, at the same time notifying the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, London, S.W.1 (reference, C.R.E. (I.B.) 13919/49), of any action taken.

THE NATIONAL UNION OF MANUFACTURERS has made a strong protest to the Chancellor of the Exchequer at his recent statement in the House of Commons regarding prices and profits. The Union has asked for an assurance that the Chancellor did not intend to convey the impression that prices were high because profits had been "so frightfully high" over the past few years.

LIC. JORGE MUSMANNI E., Comisionado Comercial Consejo Nacional de Produccion, San José, Costa Rica, wishes to receive catalogues of machinery for rope and bag making, woodworking, brickmaking, etc., and of building machinery and equipment. Firms interested should send catalogues to H.M. Consul-General, The British Legation, San José, Costa Rica, at the same time notifying the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, London, S.W.1 (reference, C.R.E. (I.B.) 14530/49), of any action taken.

"SHIPOWNERS WILL NOT PLACE MORE ORDERS until we can show something equivalent to the fervour of a religious mission that will wake up sub-contractors and suppliers of raw materials," said Sir Frederick Rebbeck, chairman and managing director of Harland & Wolff, Limited, at Belfast on May 31. "Everyone in the industry must unite to make it possible to produce ships at prices that will enable us to hold the balance evenly between what we can do and what the Continent can do." But for the shortage of steel, he added, Belfast would already be conscious of unemployment in the yards.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference E.P.D. or C.R.E. can be obtained from the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, London, S.W.1.

ATCHAM, July 1—Provision and laying of approx. 50 miles of spun-iron water mains, from 7-in. to 3-in. dia., etc., for the Rural District Council. Mr. J. R. Sockett, engineer and surveyor, 24, St. John's Hill, Shrewsbury. (Fee £5 5s., returnable.)

CAERNARVON, June 20—Supply of approx. 4,000 yds. of cast-iron pipes, etc., for the Town Council. The Borough Surveyor, Guildhall.

CHESTERFIELD, July 1—Supply of about 2,800 yds. of concrete-lined or bitumen-lined steel pipes and specials ranging from 6-in. to 33-in. dia., etc., for the Borough Council. J. D. and D. M. Watson, 18, Queen Anne's Gate, Westminster, London, S.W.1. (Fee £5 5s., returnable.)

SIAM, June 28—Kilowatt-hour meters, for the Stores Division, Railways Department, Bangkok. (Reference: C.R.E. (I.B.) 14578/49; Room 1076.)

TIPPERARY, June 21—Provision of pumping plant, supplying and laying 1,320 yds. of 4-in. dia. and 2,340 yds. of 3-in. cast-iron pipes or a.c. mains, etc., for the County Council. The County Manager, Council Offices, Thurles. (Deposit, £10.)

WALSINGHAM, June 27—Supply of approx. 24 miles 12-in. to 3-in. dia. cast-iron spun pipes, etc., for the Rural District Council. The Council Offices, Fakenham, Norfolk.

Increases of Capital

Details of increased capital have been announced by the following companies:—

BROOK FOUNDRY (BRENTWOOD), LIMITED, increased by £2,000, in £1 shares, beyond the registered capital of £500.

GLACIER METAL COMPANY, LIMITED, Alperton, Middx, increased by £100,000, in 400,000 ordinary shares of 5s., beyond the registered capital of £400,000.

WESTINGHOUSE BRAKE & SIGNAL COMPANY, LIMITED, London, N.1, increased by £300,000, in £1 shares, beyond the registered capital of £1,200,000.

BRITISH LEAD MILLS, LIMITED, London, E.C.2, increased by £350,000, in 250,000 shares of £1 and 1,000,000 shares of 2s., beyond the registered capital of £150,000.

GOULDS MECHANIZATION, LIMITED, founders, metal workers, etc., of Newport, Mon, increased by £150,000, in £1 ordinary shares, beyond the registered capital of £100,000.

BLACKETT, HUTTON & COMPANY, LIMITED, steel-founders, etc., of Guisborough, Yorks, increased by £45,000, in £1 ordinary shares, beyond the registered capital of £5,000.

MONO PUMPS, LIMITED, Audenshaw, Manchester, increased by £188,000, in 88,000 ordinary and 100,000 5 per cent. redeemable preference shares of £1, beyond the registered capital of £12,000.

CONSOLIDATED ZINC CORPORATION, LIMITED, London, E.C.2, increased by £19,999,700, in 4,499,900 preference, 6,999,900 ordinary and 8,499,900 unclassified shares, all of £1, beyond the registered capital of £300.

WALTER SLINGSBY & COMPANY, LIMITED (formerly Thomas Farrar, Limited), founders, steelmakers, etc., of Keighley, Yorks, increased by £50,000, in £1 ordinary shares, beyond the registered capital of £30,000.

BENHAM & SONS, LIMITED, engineers, etc., of London, W.1, increased by £67,500, in 30,360 "A" redeemable preference and 37,140 "B" redeemable preference shares of £1 each, beyond the registered capital of £105,000.

AVELING-BARFORD, LIMITED, manufacturers of road and earth-moving machinery, etc., of Grantham, Lincs, increased by £500,000, in £1 second cumulative preference shares, beyond the registered capital of £850,000.

RANSOME & MARLES BEARING COMPANY, LIMITED, Newark-on-Trent, increased by £300,000, in 5s. shares, beyond the registered capital of £700,000. The £700,000 stock has been reconverted into 2,800,000 shares of 5s. each.

HEENAN & FROUDE, LIMITED, engineers and iron-founders, of Worcester, increased by £275,000, in 200,000 4½ per cent. cumulative redeemable preference shares of £1 and 300,000 ordinary shares of 5s., beyond the registered capital of £700,000.

THOMAS HILL-JONES (HOLDINGS), LIMITED, manufacturers of graphite foundry blackings, etc., of London, E.3, increased by £109,900, in 599,500 ordinary shares of 2s. and 49,950 5½ per cent. redeemable cumulative preference shares of £1 each, beyond the registered capital of £100.

THOMAS HADDON & STOKES, LIMITED (formerly A. Stokes & Company, Limited), manufacturers of screws, bolts, rivets, etc., of Deritend, Birmingham, 2, increased by £50,000, in £1 ordinary shares, beyond the registered capital of £150,000. On May 14, 1948, Guest, Keen & Nettlefolds, Limited, held 50,000 shares. A further 50,000 ordinary shares were allotted to that company on December 31, 1948.

Copper, Tin and Zinc Licensing

Until further notice, applications for licences to acquire copper, tin and zinc need not be accompanied by a signed declaration that the metal is required to cover orders. The Ministry of Supply announces that licences will be granted against:—(i) A declaration that in the case of application for virgin metal full allowance has been made for the expected intake of scrap; and (ii) the usual purchase order on the Directorate of Non-ferrous Metals, giving details of specification, delivery, etc., required, or a statement that the applicant intends to purchase from a stockist. The period of validity of the licences remains unaltered.

Personal

MR. STANLEY BROOKE has been appointed a director of the Leeds Fireclay Company, Limited.

WING-COMMANDER N. J. HULBERT, M.P., has resigned from the board of British Steel Constructions (Birmingham), Limited, Wednesbury, Staffs.

SIR PERCY LISTER has been appointed a director of Broom & Wade, Limited, manufacturers of air compressors, pneumatic tools, etc., of High Wycombe.

MR. J. RAMSAY GEBBIE, managing director of William Doxford & Sons, Limited, Sunderland, has been elected vice-president of the Shipbuilding Conference for the current year in place of the late Mr. Henry Main.

MR. R. T. REDFERN, general manager, and MR. J. CONNERTON, commercial manager, have been appointed directors of the Bryan Donkin Company, Limited, mechanical and gasworks plant engineers, of Chesterfield.

MR. R. H. GALE (Ashmore, Benson, Pease & Company, Limited) and MR. W. FOGGETT (Imperial Chemical Industries, Limited, Wilton) have been respectively elected chairman and vice-chairman of the Tees-side branch of the Purchasing Officers' Association.

MR. R. A. SHREWSBURY has been appointed a director of Alexander, Fergusson & Company, Limited, lead smelters, etc., of Glasgow, in place of MR. J. R. JAMIESON, who resigned from the board on February 28. MR. W. Z. THOMAS has been appointed secretary in succession to MR. J. H. A. LOCHHEAD.

MR. D. F. BAXTER, son of the late governing director, Mr. Frank Baxter, has joined the board of Baxter, Fell & Company, Limited, iron, steel, metals and minerals merchants and exporters, of Ibex House, Minories, London, E.C.3. With MR. C. H. SMYTH-TYRRELL, he will act as joint managing director in succession to the late Mr. A. T. Smyth-Tyrrell.

MR. J. B. KERR, a director and general manager of the Wallsend Slipway & Engineering Company, Limited, has been appointed managing director of the company. MR. G. B. HALLEY, at present assistant engineering manager at the North British engine works of Barclay, Curle & Company, Limited, Glasgow, has been appointed assistant to Mr. Kerr at Wallsend and will be particularly in charge of production. Mr. Halley was a member of the plant mission which toured Germany in 1945, reporting on the German shipyards and marine-engine works.

Wills

STEWART, JAMES, of Bolton, master welder £17,876

BLACK, R. J., engineer, of Rossduff, Co. Waterford ... £11,675

MACGREGOR, GEORGE, of Saltcoats, Ayrshire, iron-founder £67,623

LEWIS, HARRY, formerly owner of the Thames Bank Iron Works £44,619

BRAND, MARK, of Ardrossan, Ayrshire, retired iron and coal master £75,607

ANDERSON, W. R., a director of Anderson & Reid, Limited, ironfounders, of Glasgow £16,843

EDWARDS, H. T., electrical engineer, of Pirelli-General Cable Works, Limited, Southampton £7,706

BOWES, A. M., a partner in John Bowes & Sons, metal merchants, of Camberwell, London, S.E.1 ... £42,771

SKINNER, ARTHUR, formerly works manager and a local director of Hadfields, Limited, Sheffield ... £2,683

PEMBERTON, B. R., a director and secretary of the Tempered Spring Company, Limited, Sheffield ... £7,766

GIBBS, W. K., head buyer of Heenan & Froude, Limited, structural manufacturing engineers, etc., of Worcester £4,012

BULLOUGH, MILES, a director of John Bullough, Limited, bolt and nut manufacturers, of Atherton, Lancs £104,184

POUNTNEY, F. C., senior works director and chief engineer of the Villiers Engineering Company, Limited, Wolverhampton £66,731

HOPWOOD, SIMEON, late director of G. Hopwood & Sons, Limited, metal and scrap merchants, of Romiley, Stockport, Ches £20,919

PURNELL, W. H., late chairman of Herbert Morris, Limited, manufacturers of cranes, boilers, conveyors, etc., of Loughborough £81,563

WISEMAN, ALFRED, founder of Alfred Wiseman & Company, Limited, mechanical and electrical engineers, etc., of Birmingham £10,986

BARRETT, G. F., late managing director of the Hoffman Manufacturing Company, Limited, ball and roller bearing manufacturers, of Chelmsford, Essex £33,675

WATSON, W. R., consulting engineer, of Putney, London, S.W., a partner in Brian Colquhoun & Partners, civil engineers, formerly consulting engineer at Walker Bros. (Wigan), Limited, colliery engineers, etc. £9,974

LANDER, PROF. C. H., of Shepperton-on-Thames, Dean of the Military College of Science and Emeritus Professor of Engineering in the Imperial College of Science and London University, Director of Fuel Research, 1923-31, president of the Institute of Fuel, 1946-48, a former lecturer in engineering at Manchester University £15,287

Changes of Name

The following companies have recently changed their names, the new titles being given in parentheses:—

PLASTIC & METAL PRODUCTS (BRIGHTON), LIMITED, Portslade (M. B. Metals, Limited).

G.T.G. ELECTRICS, LIMITED, Kingsbury, London, N.W.9 (G.T.G. Metalcraft), Limited.

F. WALKER (SURREY) ENGINEERS, LIMITED, New Malden (Malden (Surrey) Engineers, Limited).

ELECTRICAL & GENERAL ACCESSORIES (LEICESTER), LIMITED, Wednesbury (Ega Electric, Limited).

GANNOW ELECTRICAL & REFRIGERATION COMPANY, LIMITED, Burnley (Alan Yates, Limited).

I.S.C. PRODUCTS, LIMITED, ores, metals, alloys, etc., of London, E.C.2 (Imperial Smelting Corporation (Sales), Limited).

HEAD WRIGHTSON LIGHT ALLOY STRUCTURES, LIMITED, Thornaby-on-Tees (Head Wrightson Aldean, Limited).

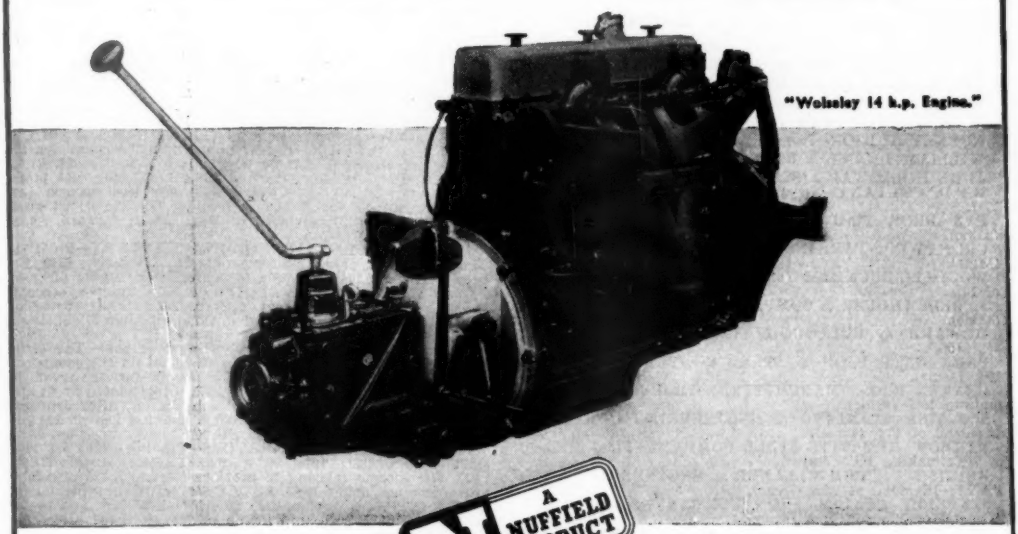
BARFORD ENGINEERING REPAIR SERVICE, LIMITED, Barford, Warwicks (Barford Engineering Company, Limited).

BOLTONS (M/C.), LIMITED, manufacturers of machinery, machine tools, etc., of Manchester (Bettencourt & Company, Limited).

A. B. CLEWORTH & COMPANY, LIMITED, merchants, founders and engineers, etc., of London, E.C.2 (Karrena Furnace Engineering, Limited).

LATCH & BATCHELOR, LIMITED, wire drawers, wire-rope manufacturers, etc., of Birmingham (Latch & Batchelor (Amalgamated with Webster & Horsfall), Limited).

LONDON & YORKSHIRE TRUST announces that application is being made for quotation for 400,000 5 per cent. cumulative preference £1 shares and 1,200,000 ordinary 10s. shares of Kirkstall Forge Engineering, Limited. It is expected that dealings will start to-day (Thursday). The company is acquiring the whole of the issued share capital of Kirkstall Forge, Limited, of Kirkstall, near Leeds.



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Company News

(Figures for previous year in brackets.)

HADFIELDS—Dividend of 5% (same).

W. H. BAXTER—Dividend of 20% (same).

PRIOR STOKERS—Dividend of 10% (same).

SPEAR & JACKSON—Dividend of 15% (same).

W. N. FROY & SONS—Dividend of 15% (same).

ROBERT HUDSON—Interim dividend of 18¾% (same)

WILLIAM DENNY & BROS.—Dividend of 10% (same).

JURY HOLLOWARE (STEVENS)—Dividend of 10% (same).

R.F.D. COMPANY—No dividend for 1948, against 8% for 1947.

EVA BROS.—Final dividend of 35% (42%), making 70% (same).

CROMPTON PARKINSON—Interim dividend of 7½% (same).

WOODALL-DUCKHAM (made public last year)—Dividend of 15%.

J. BROCKHOUSE & COMPANY—Interim dividend of 7½% (same).

HOWARD & BULLOUGH (SECURITIES)—Dividend of 4½% (5%).

PARK GATE IRON & STEEL COMPANY—Dividend of 10% (same).

CRAVEN BROS. (MANCHESTER)—Final dividend of 10%, making 15% (same).

SCOTTISH STAMPING & ENGINEERING COMPANY—Dividend of 10% (same).

BARROW HEMATITE STEEL COMPANY—Final dividend of 7½%, making 12½% (same).

BRITISH VACUUM CLEANER & ENGINEERING COMPANY—Dividend of 20% (same).

STAVELEY COAL & IRON COMPANY—Second interim dividend of 3%, tax free (same).

MELLOWES & COMPANY—Final dividend of 20% (10% and bonus of 10%), making 30% (same).

WIRE INDUSTRIES, STEEL PRODUCTS & ENGINEERING—Final dividend of 12½%, making 25% (same).

HALLAMSHIRE STEEL & FILE COMPANY—Final dividend of 35% and bonus of 10%, making 70% (same).

FIRTH BROWN TOOLS—Dividend of 5% for the 15 months ended March 31 on increased capital (7½% for 12 months).

LONDON TIN CORPORATION—Interim dividend of 8% (6%). As in recent years, there will be no further distribution.

S.G.B. (DUDLEY)—Half-year's dividend to June 30, 1949, at the rate of 6% per annum, less tax, on the 6% cumulative preference shares.

BECK & COMPANY (METERS)—Dividend of 7.7d per share, actual, less tax, on the 5½% preference shares for the period December 1, 1948, to June 30, 1949.

BERRY WIGGINS & COMPANY—Final dividend of ½% on the "A" ordinary shares, making 10½% (same); dividend of 16⅜% on the "B" ordinary shares (same).

JOHNSON, MATTHEY & COMPANY—Second interim dividend of 9%, making 12% (same). No further dividend will be paid for the year ended March 31. The 9% for 1947-48 included a bonus of 6%.

BAIRDS & SCOTTISH STEEL—Net profit for 1948, £256,428 (£157,836); provisions no longer required, £140,000; brought in, £155,797; available, £552,225 (£282,847); to general reserve, £240,000; dividend of 10% (same); forward, £185,175.

HAYDEN-NILOS—Final dividend of 40%, making 75% for the year to March 31. For the previous period of a little under eight months there was an interim dividend of 32.5% and a final dividend of 16.68%, making 49.18%, equal to a dividend at the rate of 75% per annum.

SCOTTISH STAMPING & ENGINEERING COMPANY—Net profit for 1948, £25,419 (£14,914); brought in, £5,466 (£6,226); excess on tools revaluation, £2,927 (nil); available, £33,812 (£44,853, including £23,713 reserved for E.P.T.); dividend of 10% (same); general reserve, £20,000 (£30,000); forward, £4,425.

AEROPLANE & MOTOR ALUMINIUM CASTINGS—Net profit for the year ended March 31, £19,150 (£22,645); brought in, £35,570 (£30,800); from tax reserve, £5,000 (nil); available, £59,720 (£53,445); to general reserve, £10,000 (nil); written off goodwill, nil (£11,000); interim dividend of 12½% (same); forward, £42,845.

VENT-AXIA—Profit to March 31, £75,629 (£66,942); to depreciation, £1,461 (£1,104); executive directors' salaries, £3,500 (same); directors' fees, £450 (nil); audit, £178 (£299); leaving £70,040 (£62,039); to tax, £39,287 (£35,261); share marketing expenses, £2,407 (nil); general reserve, £11,678 (£5,000); dividends of 250% (same); forward, £7,120 (£11,077).

KITCHIN & WADE—Consolidated accounts show trading balance for the year to March 31, £129,067 (£80,459); to depreciation, £8,354 (£6,979); directors' emoluments, £10,670 (£9,800); balance £110,042 (£63,680); to taxation provision, £75,366 (£36,386); general reserve, £10,000 (£5,000); dividend of 25% (same); forward, £14,632 (£10,581 from last year).

WILLSON LATHES—Balance on trading account for the year ended March 31, £46,578 (£46,767); to depreciation, £1,653 (£1,611); directors' remuneration, £3,488 (£3,450); net profit, before tax, £42,437 (£41,706); to profits and income tax, £23,550 (£22,800); future tax reserve, £5,000 (same); off goodwill, £2,000 (£2,423); dividend of 35% (same); forward, £4,120 (£1,858).

BURNTISLAND SHIPBUILDING COMPANY—Profit to March 31, after providing for profits tax, £183,497 (£160,136); brought in, £86,104 (£43,622); to depreciation, £7,561 (£9,204); reserve for income tax, £76,251 (£61,500); reserve account, £15,000 (£20,000); investment reserve, £5,000 (nil); pensions, £5,000 (£10,000); final dividend of 15%, making 20% (same); forward, £144,289 (£86,554).

EWART HOLDINGS (formerly Ewart & Son)—The directors state that in the absence of a dividend on the company's investment in Ewart & Son, the result for the year to December 31, 1948, shows a loss of £375; consolidated profit and loss account of Ewart & Son and subsidiaries, after depreciation, tax and directors' remuneration, shows a loss of £15,565; debit balance carried forward, £12,867.

IDEAL BOILERS & RADIATORS—Trading profit for 1948, £750,760 (£669,282); interest, £7,200 (£6,634); rents, £14,596 (£11,187); income relating to previous year, £21,772 (£26,561); provisions no longer required, £12,548 (nil); to depreciation, £42,230 (£35,657); income tax, £389,982 (£333,451); net profit, £374,664 (£344,556); final dividend of 7½% (5%), making 20%, tax free (same); forward, £672,366 (£465,202).

RANGE BOILERS—Consolidated trading profit for 1948, £109,871 (£148,524); to directors' emoluments, £8,166 (£9,600); auditors' fees, £637 (£550); depreciation and amounts written off, £7,746 (£8,039); income tax, £37,874 (£52,118); profits tax, £11,850 (£16,150); formation expenses, nil (£218); net profit, £43,598 (£61,849); final dividend of 15%, making 20% (same); general reserve, £40,000 (same); forward, £12,922 (£19,280).

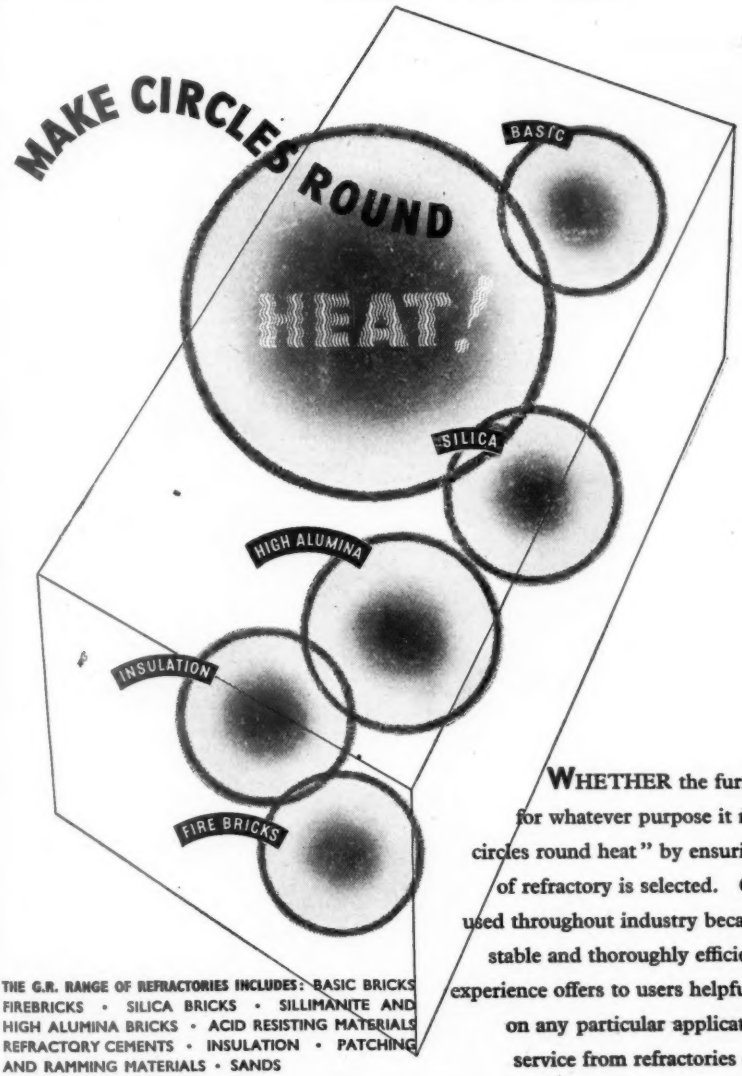
SMITH & McLEAN—Consolidated trading profit for 1948, £350,273; other income, £21,712; to directors' emoluments, £6,005; audit, £276; depreciation, £20,141; taxation, £180,124; bad debts, £68; net profit, £165,371; provisions not required, £6,307; to stock reserve, £30,000; loose tools reserve, £10,000; replacements reserve, £47,220; general reserve, £30,000; dividend of 15% and bonus of 10% (same); forward, £206,088 (£182,568).

RICHARD JOHNSON & NEPHEW—Consolidated trading profit, including sundry income, for 1948, £800,936; to depreciation, £104,440; tax, £361,985; net profit, £334,510, divided as to £325,319 to parent company and £9,191 to subsidiaries; brought in, £16,276; unrequired reserves, £32,424; available, £383,210; to obsolescence reserve, £100,000; general reserve, £180,000; forward, after preference dividend and 15% (same) on the ordinary shares, £66,910.

SCAMMELL LORRIES—Trading profit in 1948, £316,266 (£270,499); to directors' remuneration, £7,314 (£8,022); depreciation, £13,168 (£12,422); pension schemes, £12,605 (£8,237); balance, £283,179 (£241,818); brought in, £43,976 (£28,950); available, £327,155 (£270,768); to tax, £147,443 (£125,340); pensions reserve, nil (£30,000); stock reserve, £70,000 (£30,000); plant and machinery reserve, £20,000 (£30,000); general reserve, £20,000 (same); dividend of 10% (same); forward, £48,260.

GASKELL & CHAMBERS—Consolidated accounts for 1948 show trading profit, £181,354; other income, £1,384; to depreciation, £13,515; directors' remuneration, £27,395; audit, £1,694; tax, £72,272; leaving £67,862, of which £7,815 is attributable to outside shareholders of subsidiaries; consolidated net profit, £60,047; brought in, £71,141; excess tax provision, £1,338; to directors' fees, £3,050; stock depreciation reserve, 20,000; tax under-provided for 1948-49, £6,348; parent company's dividends, £17,316; forward, £85,812.

S. GUITERMAN & COMPANY—Consolidated trading loss for 1948, £17,194 (profit £52,350); credit rents, £1,075 (£1,319);



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interest, £154 (£360); to directors' emoluments, £5,759 (£10,637); depreciation, £838 (£425); fees and legal expenses, £762 (£707); interest, £14 (£473); loss, £23,338 profit (£41,787); to tax credit, £14,000 (nil); to preference dividends £1,664 (£1,817); tax provision, nil (£22,500); reserves, nil (£10,000); ordinary dividend, nil (15%, plus bonus of 10%, £7,562); forward, credit, £7,680 (£18,682).

ALLEN WEST & COMPANY—Consolidated trading profit to January 31, £721,986; investment dividends, £499; to tax, £339,988; directors' emoluments, £28,940; pension fund, etc., £29,933; depreciation, £57,650; written off subsidiary goodwill, £4,440; deferred repairs, £16,000; auditors' remuneration, £1,163; attributable to minority shareholdings, £789; leaving £243,582; brought in, £140,747; to parent's general reserve, £200,000; parent's dividend of 7½% and bonus of 2½%, making 10% (same); forward to parent £119,587, to subsidiaries £31,226.

HERBERT TERRY & SONS—Surplus, including rents, etc., for 1948, after charging administration expenses, £326,397 (£195,579); to depreciation, £10,182 (£11,067); directors' emoluments, £10,793 (£9,811); pension fund, £6,077 (£5,709); audit, £525 (same); taxation, £164,309 (£97,260); dividends and interest, £11,651 (£8,129); net profit, £146,162 (£79,336); dividend of 30% (same); reserve for replacement of plant and machinery, £45,000 (nil); equalisation of dividends account, £30,000 (£15,000); general reserve, £40,000 (£35,000); forward, £26,980 (£26,481).

SPARK ALLOYS (and subsidiary, British Flint & Cerium Manufacturers)—Trading profit to January 31, £81,804 (£69,520); to depreciation, £1,230 (£1,554); directors' fees, £1,000 (same); other emoluments, £6,531 (£6,392); auditors, £252 (£175); profits tax, £13,376 (£13,000); income tax, £27,050 (£22,000); consolidated net profit, £32,365 (£25,399); retained in accounts of subsidiary, £8,990 (£2,024); net profit of Spark Alloys for 10 months to January 31, £23,375 (same); holding company, final dividend of 33⅓%, making 100% (same); forward, £6,875 (nil).

BRITISH AUTOMATIC COMPANY—Consolidated net trading profit for 1948, £131,627 (£141,590); to maintenance provision, £12,189 (£12,255); sundry revenue, £3,621 (£4,999); balance, £123,059 (£134,334); to depreciation, £35,079 (£34,897); directors' emoluments, £10,069 (£10,282); directors' pension, £1,343 (same); profits tax, £13,232 (£14,739); income tax, £39,418 (£46,401); net profit, £23,918 (£26,672); brought in, £13,858 (£11,233); available, £37,776 (£37,905); to written off goodwill, £3,457 (£5,300); reserve, £767 (£5,547); dividend of 6% (same); forward, £20,352.

SHEFFIELD TWIST DRILL & STEEL COMPANY—Trading profit for 1948, after all expenses of manufacture and administration, £378,643 (£305,152); trade investment dividend, £13 (same); tax certificates interest, nil (£1,200); rents, £72 (£70); fees, £393 (nil); brought in, £13,503; profit prior to date of vending agreement, nil (£229,796); making £392,624 (£76,639); to tax, £297,750 (£44,000); preference dividend, £12,375 (£3,094); final ordinary dividend of 20⅞%, making 33¾% (8¼% for three months, equivalent to 33⅓% per annum); forward, £18,332.

PEGLERS—Trading profit, with property income, for the year ended March 31, £375,774 (£430,307); to depreciation, £37,994 (£32,394); employees' bonus, £23,496 (£22,465); auditors' remuneration, £700 (£678); directors' emoluments, £18,434 (£22,625); tax, £159,000 (£196,000); net profit, £136,150 (£156,144); brought in, £28,640 (£26,278); tax reserve certificate interest, £9,405 (nil); available, £174,195 (£182,422); to general reserve, £80,000 (£55,000); stock reserve, nil (£25,000); dividend equalisation, £10,000 (£30,000); dividends of 2s. 3d. per "A" and "B" 5s. ordinary share (same); forward, £40,413.

BRITISH OPTICAL & PRECISION ENGINEERS—Consolidated trading profit, with sundry income, covering the period from the incorporation of the holding company, November 24, 1947, to December 31, 1948, £407,488; to depreciation, £130,755; audit fee, £5,579; interest, £82,850; balance, £188,304; to subsidiary profits prior to incorporation, £52,276 applied in reduction of goodwill, leaving £136,028 for nine months; unrequired provisions, £10,703; profit on sale of assets, £2,565; to tax, £58,298; outside shareholders, £22; preference dividend of holding company, £10,154; ordinary dividend of 5%, £27,225; forward, £53,396.

PRESSED STEEL COMPANY—Trading balance for 1948—after directors' emoluments, etc., £26,687—£1,618,868 (£1,114,147); fees, £234 (£289); to depreciation, £328,710 (£276,363); debenture interest, £9,900 (£10,440); registration expenses, £1,992 (£2,203); remuneration trustees for debenture holders, £21 (same); auditors' remuneration, etc., £1,488 (£1,419); profits tax, £190,000 (£150,000); income tax, £533,453 (£318,000); profit, £553,538 (£355,990); brought in, £770,278 (£617,178); contingency provision no longer required, £560,000; available, £1,883,816 (£973,168); to general reserve, £417,794 (nil); contingencies, nil (£50,000); final dividend of 20%, making 30% (same); forward, £1,313,131.

SIEMENS BROS. & COMPANY—Consolidated trading profit for 1948, including approximately £280,000 (£150,000) in respect of the previous year, £1,272,536 (£1,038,434); investment income, £36,382 (£37,751); profit on realisations of profits and plant, £19,400 (nil); to auditors' remuneration, £3,258 (£2,339); tax, £617,537 (£452,090); depreciation, £225,400 (£194,851); deferred repairs, £31,700 (nil); net profit, £450,423 (£426,905); brought in, £928,365 (£917,176); unrequired tax provisions, £20,141 (£45,000); available, £1,398,929 (£1,389,075); to capital redemption reserve, £50,000 (nil); fixed assets replacement, £25,250 (nil); general reserve, £172,000 (£75,000); contingencies, nil (£135,000); 10% preference dividend, £55,000 (same); 4% preference dividend, £40,000 (£11,960); ordinary dividend of 7½% (same); forward, £872,929.

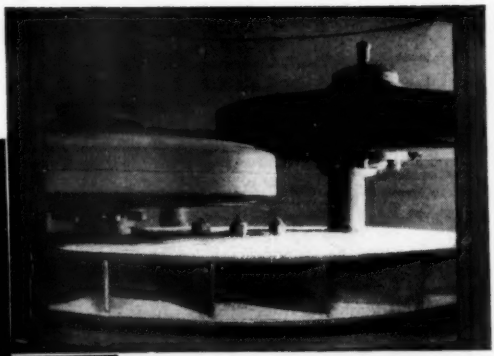
JOHN LYSAGHT—Consolidated trading profit for 1948, £1,043,409 (£934,326); investment income, etc., £567,002 (£283,176); to debenture interest, £121,309 (£119,870); depreciation, £259,602 (£395,403); audit, £3,190 (£3,651); taxation, £722,154 (£416,307); group net profit, £504,156 (£282,271); profit on realisation of investment, £30,816 (£88,125); surplus taxation and income not applicable to year, less charges not applicable to year, £81,287 (£13,974), making £616,259 (£384,370); to profits of subsidiaries attributable to shares held outside group, £10,585 (£4,309); profits retained by subsidiaries attributable to group, £108,501; balance transferred to parent's appropriation account, £497,173 (£496,009 after withdrawing £115,948 from subsidiaries' reserves); brought in, £545,242 (£434,033), making £1,042,415 (£930,042); to general revenue reserve, £200,000 (same); dividend of 15% (same); forward, £657,615.

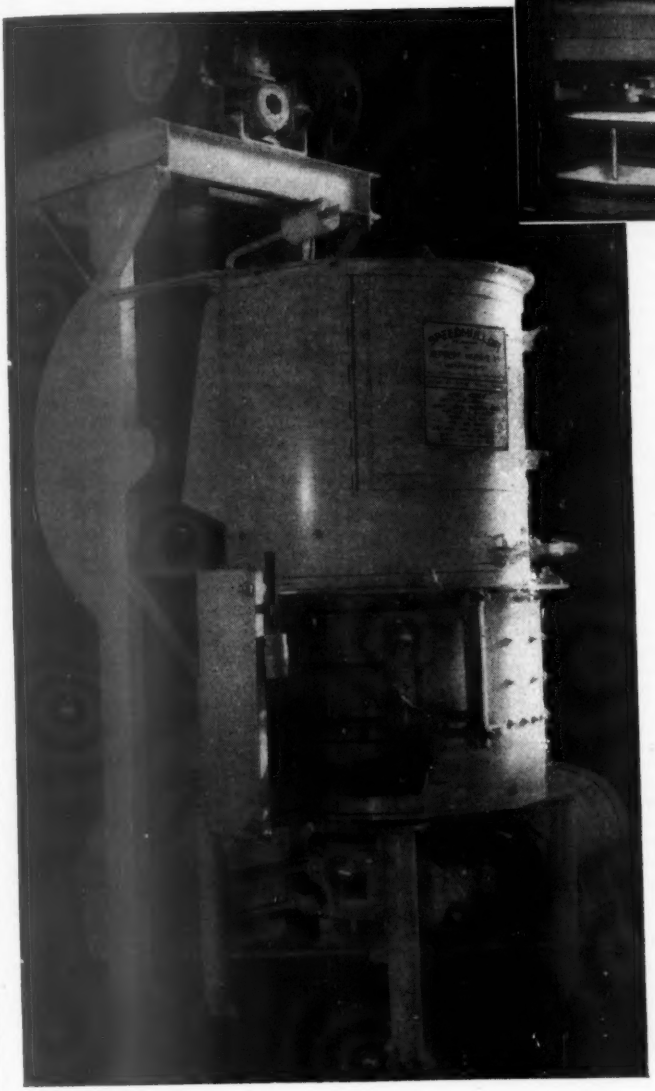
IRON TRADES EMPLOYERS' INSURANCE ASSOCIATION—Premium income for 1948, less reinsurances and transfer to catastrophe fund, £2,949,238 (£3,846,024); interest and dividends, £116,487 (£108,736); to payments under policies, including expenses, £2,810,989 (£2,533,491); commissions, £36,649 (£38,338); management expenses, £153,981 (£144,924); directors' fees, £6,500 (same); to profit and loss, £1,002,549 (£1,252,389); fund, £4,456,008 (£5,400,951); brought in, £72,640 (£119,902); from revenue account, £1,002,549 (£1,252,389); to premium return fund, £626,000 (£765,264); bonus fund, £116,487 (£108,736); staff trusts fund, £20,000 (£50,000); written off furniture, etc., £11,384 (£5,151); off premises, £21,250 (£20,500); catastrophe fund, nil (£150,000); general reserve, £175,000 (£200,000); forward, £105,068. The directors recommend the return of 21% (20%) of employers' liability, third party and personal accident premiums paid for 1948, together with a bonus of 4% (3%), on which income tax has already been paid, making a total return of 25% (23%).

PLATT BROS. & COMPANY (HOLDINGS)—Consolidated profit and loss account for 1948 shows balance of trading accounts, £2,640,413; investment income, etc., £118,768; to depreciation, £341,672; debenture and loan interest, £16,531; directors' remuneration, £2,813; past directors' pensions, £562; auditors' fees, £2,954; loss on conversion of investments, £1,449; tax, £1,238,574; consolidated net profit, £1,154,626 (£360,782 for year to March 31, 1948); attributable to minority interests, £90,343; undistributed profit of subsidiaries to minority interests, £418,540; net profit, £645,743, of which £525,414 is undistributed profit of subsidiaries and £120,329 profit of parent company; brought in, £278,232, plus £10,796 from internal reserve, being net adjustment on revaluation of stocks, making a total of £934,771; to taxation adjustments for earlier years, £118,041; capital reserves, £223,843; revenue reserves, £215,040; preference dividends (for nine months), £40,812; ordinary dividend of 10% actual, £37,772; forward, £299,263, of which £278,328 is on account of subsidiaries and £20,935 on account of parent company. A resolution will be submitted at the annual meeting to adopt new articles of association. It is proposed among other changes to reduce the qualification of a director from nominal capital of £10,000 to £1,000.

AN ORDER has been received by the Fairfield Shipbuilding & Engineering Company, Limited, Govan, for a 6,000-ton passenger and car ferry for the Canadian Pacific Railway Company.

A new and better way to mull sand





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SPEED MULLOR

Using rubber instead of steel surfaces to mull sand and yet applying great pressure without crushing the sand grains is one of the revolutionary principles of the Speedmullor. Others are described and illustrated in Book 222.

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Raw Material Markets

Iron and Steel

The demand for pig-iron is maintained by the engineering, speciality and jobbing foundries, and available supplies of the low- and medium-phosphorus grades, together with any tonnages of hematite which can be released for their use, are readily accepted. Supplies of the latter grade have been particularly scarce of late, but it is expected that the furnaces will shortly be able to release larger supplies to the foundries.

The engineering foundries have been using larger quantities of the refined grades of pig-iron to make up for shortages of other grades, this type of pig-iron being obtainable quite freely. In fact, a number of the light foundries have found it necessary to utilise a percentage of the refined grades in their mixtures, due to meagre supplies of high-phosphorus pig-iron, but generally this has not proved very satisfactory.

Most foundries have sufficient orders on hand to keep them well employed. Many of them are engaged on castings for the export market, either as finished units, such as baths, cisterns, heating and cooking apparatus, or in conjunction with contracts for machinery, plant, etc., and, apart from their present home commitments, there is a possibility of a wider demand for castings when building programmes and other schemes now under suspension can be undertaken.

Foundry coke supplies are coming forward satisfactorily, but there are still occasional complaints concerning quality. Ganister, limestone and ferro-alloys are quite plentiful.

The large increase in the import of semis from abroad continues. This has benefited particularly the re-rollers of light sections, bars and narrow strip, and also the sheet mills. These products are now being supplied to consumers in increasing quantities, but heavy order-books necessitate a continuance of the supply of semis at present levels. The call for sheets of all grades shows no diminution. There is a keen demand for the products of the re-rollers from home sources, which, together with their export commitments, ensures maximum outputs commensurate with supplies of semis which can be obtained.

Makers of finished iron are well covered for orders for a considerable time ahead. Shipbuilders, as well as other heavy industries, absorb the major portion of the output and a limited tonnage is also being taken up by stockholders. Supplies of forge pig-iron are reasonably good, deliveries being sufficient to cover current requirements, but the scrap position is still extremely difficult.

Non-ferrous Metals

Perhaps one of the most noteworthy matters in the non-ferrous metal situation in this country during the present year, and particularly since trade began to languish in the United States, has been the manner in which consumption of copper and zinc has been maintained. In the first quarter our usage of virgin copper exceeded 30,000 tons per month average, being in March 32,634 tons. April, however, brought a sharp setback to 23,192 tons out of a total of 37,666 tons. The corresponding figure in March was 48,368 tons, from which it will be seen that, although consumption of secondary copper declined in April, the fall was not so great as it was in virgin.

Stocks of copper in the United Kingdom went up, as might be expected, by some 10,000 tons, and unless May and June bring a noteworthy improvement in the tonnage absorbed by industry, it seems certain that the half-year will see us with a much-increased stock of copper in this country. Stocks of zinc have been reported as around 50,000 tons at April 30, so that manufacturers of brass and copper products have no need to worry on the score of supplies. As in the case of copper, it is likely that the country's stocks of zinc will tend to increase as the year goes on. April consumption of these two metals showed a sharp drop compared with March, and the difference cannot be ascribed entirely to the Easter holidays. Details are as follow:—Consumption of lead in April, 22,852 tons, against 28,685 tons in March; consumption of zinc, 13,571 tons in April, compared with 19,585 tons in the previous month.

Quotations in the United States have shown no improvement. In fact they have lost ground, for since our last report lead has declined by 1 cent per lb. to 12 cents, while zinc lost 25 points to close the week at 10¼ cents. Business in copper has been quiet and the price somewhat nominal at 18.62 cents on the domestic market. A small business is reported at that figure both for home and export, while in lead more interest has been displayed by American consumers since the latest fall in the price. Nevertheless, sentiment across the Atlantic is still bearish and prices are talked lower. Rumour is rife in various directions, one report being to the effect that the U.S. Government is contemplating abandoning the stockpiling of zinc. Tin, too, is coming in for its share of price disparagement and there are suggestions of a reduction in the quotation before long.

WHEN HE ADDRESSED a luncheon of the North Regional Council of the Federation of British Industries, on June 1, Sir Robert Sinclair, president of the F.B.I., referred to the recent attack on high profits by the Chancellor of the Exchequer. Various people had not been slow to point out the apparent inconsistency between what Sir Stafford Cripps was alleged to have said and what he said at Margate last year. "The fact, of course is," said Sir Robert, "that, by and large, high prices, and unfortunately many of our prices are high, are due to high costs and not to high profits. Distributed profits (£730 million) have risen by only 45 per cent. since 1938, while the price of consumer goods has risen by 80 per cent. and the national wage bill by 130 per cent." The net addition to reserves after taxation and the allowance for wear and tear was estimated at less than £250 million in 1948, which was a very small figure in relation to the requirements it had to cover.